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*Bc* Society of Bengal

NO. ....









JOURNAL  
OF THE  
ASIATIC SOCIETY  
OF  
✓  
BENGAL.

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EDITED BY  
THE SECRETARY AND SUB-SECRETARY.

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VOL. XII.  
PART I.—JANUARY TO JUNE, 1843.  
NEW SERIES.

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"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of *Asia* will commit their observations to writing, and send them to the Asiatic Society, in Calcutta; it will languish, if such communications shall be long intermitted; and will die away if they shall entirely cease."—SIR WM. JONES.

CALCUTTA :  
BISHOP'S COLLEGE PRESS.

1843.



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# JOURNAL

OF THE

## ASIATIC SOCIETY.

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*Documents relating to THE GATES OF SOMNATH; forwarded to the Society by the Government of India. With Plates.*

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*Report of a Committee assembled by Order of Major General NOTT, to report on the state of the Gates brought from Ghuznee.*

*Camp near Peshawur, 8th November, 1842.*

Considering the great age of these gates, the probable injury sustained by them in their displacement from the temple of Somnauth, and transport to Ghuznee, the circumstances of their having been taken down and buried during the invasion of Affghanistan by Chenghiz Khan, to preserve them from destruction by the troops of that conqueror, and their subsequent disinterment and re-erection, they must be deemed in good preservation. Great care has been observed in their packing and carriage since their removal from the tomb of Mahmood at Ghuznee, and they do not appear to have sustained any material damage from their transport thus far on their return to India.

The tomb of Mahmood of Ghuznee has been for ages a place of pilgrimage, almost of adoration, to Mahomedans, and the gates objects of especial attention; it is not therefore matter of surprise, that the lower portions of the gates within the reach of a man's hand have suffered greatly; the carved work has in some places disappeared, small portions having probably, from time to time, been abstracted as relics. Here and there pieces of carved wood, perhaps of the same antiquity as the gates brought with them from Somnauth, but dissimilar in pattern, have been used to replace the original carving, and in other places

inferior material and workmanship have been employed to repair the fabric. But the upper portions of the gates still retain much of the original carving, which is in high relief, of beautiful execution, and in a wonderful state of preservation.

The gates appear to have been formerly decorated with plates of some precious metal, fixed to the wood work round the carved compartments by small slips of iron. Many of these slips still remain in regular patterns, over the top of the gates, lower down they have altogether disappeared.

The frames of the gates are in double folds hinged in the centre, their height is eleven feet, and their aggregate width nine and a half feet.

The gates are surrounded by a framing composed of small pieces of carved wood, united by numerous joints in regular pattern. This portion of the work, though of great age, seems of more modern and slighter manufacture than the gates themselves. The exterior dimensions of their framing, (now in four separate portions,) are sixteen and a half feet in height, thirteen and a half in width. The framing is in very fair preservation, excepting near the ground, where seats seem to have existed on either side the gateway, and the portions of the framing in this position, to the height of a man's shoulders, have been fairly rubbed away. The construction of their framing, and the numerous joints of the work render it peculiarly liable to damage from travelling over rough roads, or from frequent removal.

We are of opinion, that it will not be difficult to restore all essential portions of the gates that are now wanting, and to fix them in serviceable condition in any building destined to their reception; but some judgment would be required to make any repair or restoration harmonize with the air of extreme antiquity possessed by the original portions of the gates.

In consonance with the Major General's request, we have the honor to forward herewith sketches of the gates, with the dimensions accurately entered on the face of the drawing.

The Major General having desired the Committee to state their opinion as to the expediency of conveying the gates in a frame adapted to elephant carriage, we beg to state our apprehension, that such a mode of conveyance might be productive of serious injury to them.

The wood is extremely dry and brittle, and the greatest care is requisite to guard against the more delicate portions of the work being even touched. The gates are not heavy; they do not probably exceed 500lb. in weight, and we estimate the entire weight of the gates and framing at less than half a ton; but their surface is great compared with the scantling of the frame-work, and the swaying motion of the elephant, and the necessity that would exist for daily loading and unloading the animal, could scarcely fail to open the joints and dislodge the frailer portions of the work, however carefully secured.

We would therefore respectfully suggest, that a car with a double framing between which the gates should be placed, and to which they should be secured by wedges well padded, measures being taken to prevent the entire weight of the gates falling on any portion of their own frame-work, might be expediently prepared at Ferozepore to receive them, such car being adapted to elephant draft. But the gates alone should, we think, be thus carried, the framing being transported to its destination packed as (with the gates) it is at present in felts and tarpaulins. In any case, we would recommend that on their arrival at Ferozepore, both the gates and framing should be carefully examined, and some strengthening by ties and braces given to the slighter portions, to guard, as far as possible, against the chance of small pieces becoming dislodged, and perhaps lost on the road.

In examining on this occasion the framing surrounding the gates, the Committee observed a Cufic inscription carved in the wood, with a copy and translation of which appended to our report, we have been furnished by Major Rawlinson. We think that it will give an interest to this document, if we attach to it a translation of the inscription on Mahmood's tomb, with which we have been favored by the same distinguished orientalist. Lieut. Studdart has also enabled us to annex a drawing of the sarcophagus, with an exact copy of the Cufic inscription thereon.

(Signed)	EDWD. SANDERS, <i>Major, Eng. and Presdt.</i>
,,	C. BLOOD, <i>Capt. Bombay Art. and Mem.</i>
,,	JOHN STUDDART, <i>Bombay Eng. and Mem.</i>
,,	C. F. NORTH, <i>Lieut. Bombay Eng. and</i> <i>Member.</i>

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*Copy and Translation of an Arabic Inscription upon the Gates of Somnath, which have been brought from the tomb of Mahmud of Ghuzni.\**

*The same rendered in modern Arabic.*

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ غُفْرَانٍ مِنَ اللَّهِ لِلْأَمِيرِ الْأَجَا السَّيِّدِ الْمَلِكِ  
 الْمَوْلِدِ أَمِيرِ الدَّوْلَةِ وَأَمِيرِ الْمِلَّةِ أَبُو الْقَاسِمِ مُحَمَّدُ بْنُ سَبَاكْتَاغِينَ رَحِمَهُ  
 اللَّهُ عَلَيْهِ وَلَوْ رَحِمَهُ لَهُ

*Translation.*

In the name of the most merciful God—(may there be) forgiveness from God for the most noble Ameer, the great King (he who was) born to become the Lord of the State and the Lord of Religion, Abil Kasim Mahmood, the Son of Sabaktagin. May the mercy of God be upon him [remaining phrase illegible].

(Signed) J. A. RAWLINSON.

*Translation of the Inscription in Cufic Characters on the Sarcophagus of the Tomb of Sultan Mahamud at Ghuzni.*

*Translation.*

May there be forgiveness from God upon him, who is the great Lord, the noble Nizam-ud-din Abul Kasim Mahmúd, the son of Sabaktagin. May God have mercy upon him.

*Mem.*—On the reverse of the Sarcophagus, there is an inscription in the Neskha character, recording the date of the decease of Sultan Mahmúd, as Thursday, the 7th remaining day (*i. e.* the 22d or 23d) of the month of Rabi'ul Akhir, A. H. 421.

(Signed) J. A. RAWLINSON.

\* See lithograph.

*Inscription in the original Guse upon the Gates*

للمم الملك الرحيم الرحيم عدا ربح الله الكا عدا ربح الله الملك الحوا طافلا الطولة واحدا الملة الوالعه اللم حمو دل الله الملك رحيم الله عدا ربح الله عدا ربح الله



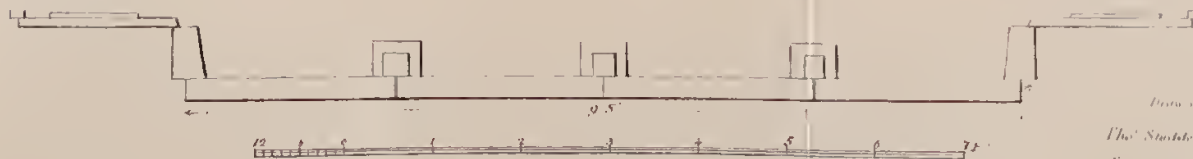
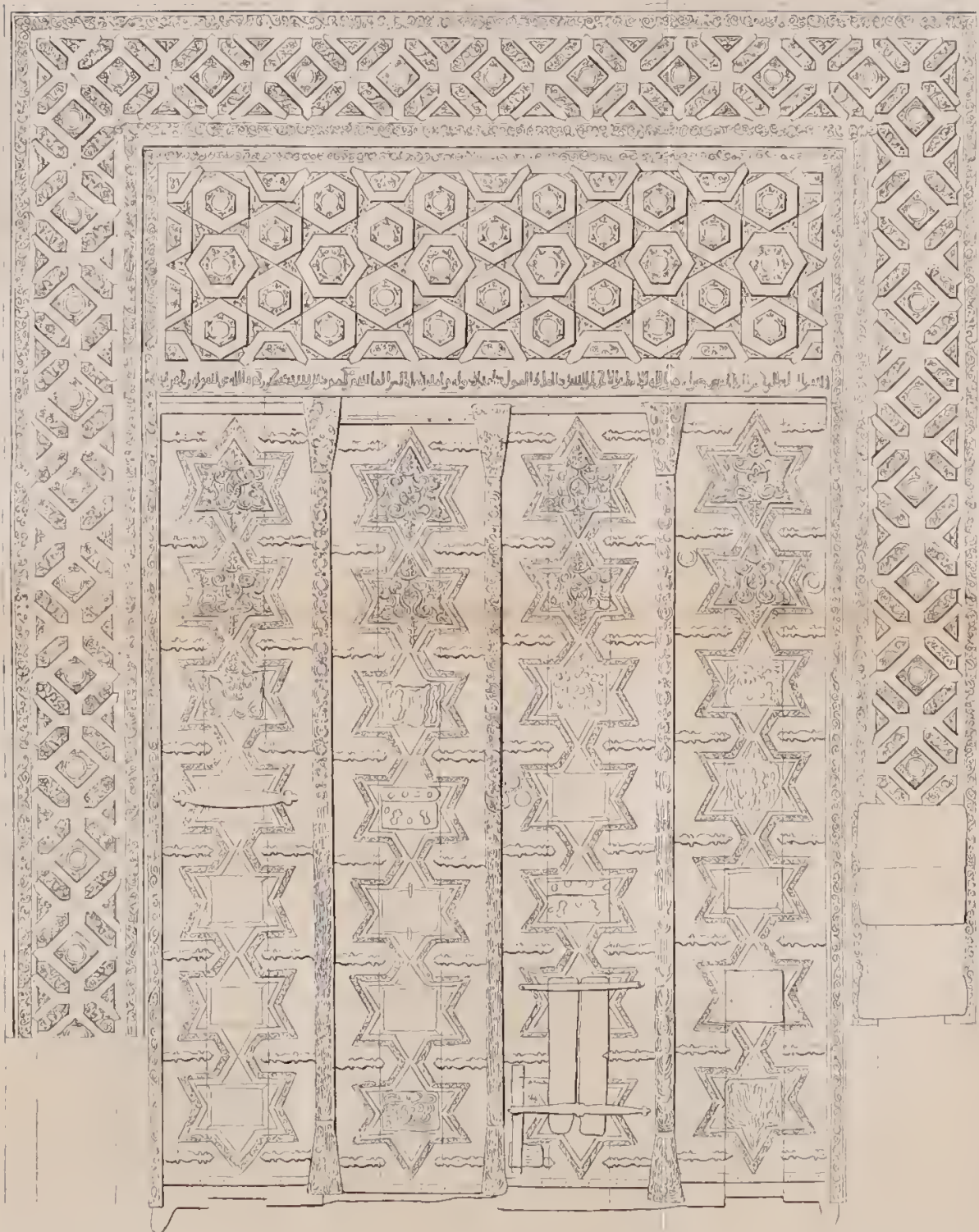


# Drawing of The Gates of Somnath

to accompany

A Committee Report.

8<sup>th</sup> Nov 1842 Peshawar



Drawn by

The Student and  
Engineers & Members

Khan<sup>d</sup> Sandhu, Major  
Engineers, President



*Sketch*  
of the  
Marble Tomb of Sultan Mahmud

*By Tho<sup>s</sup> Stoddert, Lieut<sup>t</sup>  
Engineers*



*End*





Top Star on the left leaf.

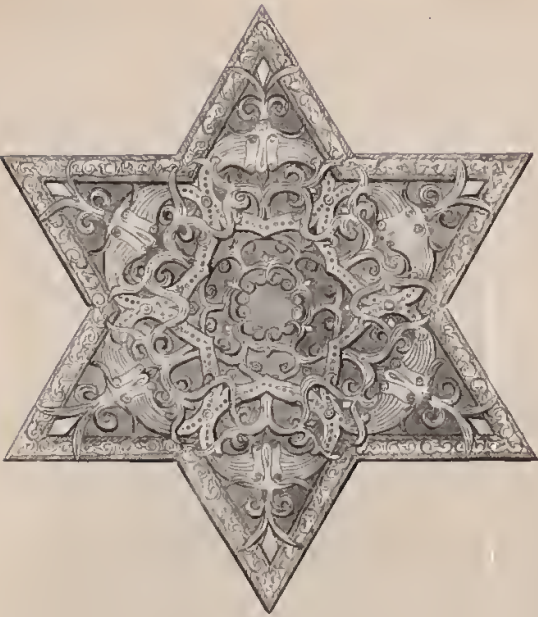


170

170

1st from the top on the 2<sup>d</sup> leaf from the left

2<sup>d</sup> from the top on the right leaf





*Copy in the Suls Character of the Cufic Inscription on the Minaret  
(Munarah,) nearest the village of Rozah.*

بسم الله الرحمن الرحيم السلطان الاكرم  
ملك الاسلام يمين الدولة وامين الملة ابوالمظفر ظهير المسلمين و  
معين المساكين ابي القاسم محمود انار الله برهانه بن سبكتگين غازي  
المغازي امير المؤمنين امر ببناء هذالعامه العالة العلية قدتمت  
باليمن والبركتة

*Translation.*

In the name of God the most merciful.

The high and mighty Sultan, the Melic of Islam, the right arm of State, Trustee of the Faith, the victory-crowned, the patron of Moslems, the aid of the destitute, the munificence endowed, Mahmood, (may God glorify his Testimony,) son of Subaktageen, the Champion of Champions, the Emir of Moslems, ordered the construction of this lofty of loftiest of Monuments: and of a certainty it has been happily and prosperously completed.

*Copy in the Suls Character of the Cufic Inscription on the Minaret,  
(Munarah,) nearest the town of Ghuznee.*

بسم الله الرحمن الرحيم امر السلطان  
الاعظم ملك الاسلام اعلام الملكة والدولة ابوسعيد مسعود بن ظهير  
الدولة محمود ابوابراهيم نصير الدين امير المؤمنين يمين المملكة  
امين الملة مالك رقاب الامم سلطان المكرم الحماقان مولى ملوك  
العرب والعجم خلد الله تعلي ملكه وسلطانه وافاض علي العلمين  
بره واحسانه غفر الله لاولوالدي ولجميع المسلمين

*Translation.*

In the name of God the most merciful.

(Erected.) By order of the mighty Sultan, the Melic of Islam, the standard of dominion and wealth, the august Masood, son of the supporter of the State, Mahmood, father of Ibraheem ; defender of the Faith, Emir of Moslems, the right arm of dominion, the Trustee of the Faith, the master of the necks of the nations, the noble and imperial Sultan, Lord of the countries of Arabia and Persia. May the great God perpetuate his throne and kingdom, commemorated be his beneficence. May God forgive the sins of himself, his parents, and of all Moslems.

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*Extract from the Journal of Lieut. J. A. WELLER, Executive Engineer and Officiating Junior Assistant Commissioner in Keemaon, on a trip to the Bulcha and Oonta Dhoora Passes with an eye-sketch. Forwarded by J. H. BATTEN, Esq. C. S., Keemaon.*

26th May, 1842.—Milum. Up early, and started at 4h. 20m. A. M. after *burrul*, a herd of which my shikaree had seen the previous evening on the N. E. side of the hill behind Milum. For some reason, Nagoo and Dhunsing, who were acquainted with the country, wished me to ascend the hill behind Milum a little to the West, and then go over the crest after the *burrul* ; I consented of course, and believe my bad luck in not killing any thing, was owing to this mistake. For when I did see the *burrul*, it was late in the morning, and they were ascending the hill where my shikaree had seen them, after feeding ; whereas had I gone round to the N. E., I should most probably have seen them feeding low down early in the morning, and had a fair chance of one or two good shots. However, at 5h. 5m. I reached the top of hill visible from Milum, by a dangerous sheep track, thence up a continuous slope of moderate steepness, affording plentiful grazing to sheep and cattle, a few of which latter (jooboos) were feeding ; continued ascent till 7h. 5m., when I halted for a cheroot and some biscuits. Dense clouds, and a heavy drifting haze sbut out the surrounding hills from view ; this I much regretted, as being North of Nundee Devi, and at a good elevation, I might have seen a magnificent view of that mountain and its neighbouring peaks, had the sky been clear. Possibly



also, I might have seen Oonta Dhura. Small flakes of snow fell now and then, and the weather was very cold. At 7h. 42m. started again up the ascent, and on till 9 A. M., when on the side of a hill North of me, and separated by a rather steep descent, one of my party spied a herd of sixteen or twenty *burrals*. We all lay down immediately, and crept back over the crest of the hill, but unfortunately the *burrals* had seen us, and commenced slowly ascending the hill. I made the best haste I could up the hill, keeping its crest between me and the *burrals*, until arriving at a spot opposite to where they were in a snowy hollow. Now I should have gone still higher to a cragged peak, and left a man to go below the *burrals*, and drive them up when he saw me at the top. Instead of this, the shikaree thought I could get close to them by creeping across the intermediate space, covered by the side of the hollow in which the *burrals* were. I did as he wished, but the space we had to cross was landslip, from which stones occasionally rolled down in spite of all our care. The *burrals* must have heard these, and were ascending the opposite side of the hollow; when getting sight of me, they made towards the crest of the hill at once. I saw them pass over, each in turn halting for a second or two upon a small rock; but a thick haze was drifting between them and me, and constantly shut them out from my view; owing to this haze, the distance appeared to me greater than I afterwards found it to be; and as the *burrals* are seldom to be approached a second time after once being alarmed, I put up the second sight of my rifle and took one shot when the haze was rather less dense than usual; missed, the bullet probably going too high, and almost immediately the haze shut out every object within ten yards of me, so that I could not get a second shot. The shikaree ascended the hill as fast as he could, but was unable to perceive where the herd went; and after going up to the crest, I halted at 9h. 30m. for a cheroot, infinitely disgusted with my bad luck in not getting one decent shot; for firing through a cloud can hardly be called one. Started at 9h. 48m., made a slight sweep round to the West for the chance of seeing the *burrals* again, but in vain, and commenced the descent to Milum. The hill side was not very steep, and consisted of one immense sheet of loose slate, an incipient landslip in fact. I descended very fast almost at a run, snow falling and bitterly cold, East wind blowing. This changed as I got

lower down, and the sun was intensely hot, so that I was glad to find myself back at the village at half-past twelve, after nearly eight and a quarter hours' exertion, seven and a quarter hours of which were incessant travelling. The sun when it does shine out is very powerful, or rather it feels so, and my face is now half raw, and the colour of a beefsteak. The pain and annoyance of this is all the inconvenience I have yet felt, and my health and strength are (thank God) first rate, a state hardly to have been expected.

After breakfast, I was much surprised to find that the Lama\* had suddenly made up his mind to start for Tooling, and had left with six ponies and two servants shortly after I started in the morning; no person was acquainted with his intentions, or can give any explanation for his sudden departure. The Lama's remaining two or three servants, who were to have followed with some goats, &c., treated themselves to a jollification upon the happy event of their master's return, and are now all dead drunk. In the course of the afternoon, they came to where I am living, and one man commenced singing by no means unmelodious songs, accompanying himself with motions of the hands, feet and body, exactly similar to those of nautch women at Almora, or in the plains. Another fell down with an awful thump on the hard stones, but was picked up unhurt and laughing. I was rather glad when they were persuaded by me to go to sleep. These people started early next morning. Nagoo describes them as wonderful travellers, and says, they think nothing of ascending Oonta Dhura with a heavy load.

27th May.—Had a long sleep after yesterday's fag, and did not get up till 6h. 30m. A. M. Though if my heel had not been galled and face so very painful, I should probably have tried the *burrul* again. Morning very mild and pleasant. Ther. 55° and no wind, but about 10 A. M. an East wind sprung up. Seven or eight jooboos reported present, and the remainder faithfully promised by evening, so that I may start to-morrow morning. Busied myself during the day in selecting clothes, &c. for the trip, and in making a plan of the country beyond the Pass, according to Nagoo's information. Ther, in the sun at noon, 80°;

\* The Lama of Tooling, a refugee to Almora during the invasion of Thibet by Zorawur Sing and the Sikhs, and after the spoliation of his temple by them.—J. H. B.

about 11 o'clock it was 5 or 6 degrees higher. During the morning, I endeavoured to obtain some information as to the country beyond the Pass, but a number of people being present, I did not like to ask such minute questions as would enable me to map down places with any degree of accuracy, and the inattention of the Boteas with reference to north and south, renders it difficult to obtain correct ideas of localities from their information. Nagoo produced a map, of which I may make something when I can get him quietly alone. At 2h. 50m. I started to see the Sunchee Koond, a small sheet of water some distance up the glen of the Goree river, held in great repute as a place of pilgrimage. I reached it 4h. 45m. travelling slowly along a gentle ascent, intersected by numerous water-courses from the hill on right, (North,) and found it to consist of a small triangular-shaped piece of greenish water, perhaps 100 yards by 80 in its largest dimensions. I had no means of ascertaining the depth. The mass of desolation, as described at the source of the Goree, continues thus far up; and how much farther no one can, or will, inform me. The fissures hereabouts are narrow, instead of being crater-like; and the ice where visible is more nearly the color of snow. On the opposite (South) side, huge accumulations of ice and gravel are to be seen in the openings between the hills; and generally, the sides of the hills in this vicinity do not appear so much cut up by landslips as lower down. The weather was very cloudy, and bitterly cold, with a few drops of rain occasionally. I had no opportunity therefore of gaining a view further Westward, or on either side to any extent, but I consider this glen would amply repay a few days devoted to its inspection. Once on either side, I had a view of the old ice high up on the hills; and its light sea-green color, with strongly defined and fantastical lines of shape (castles, stairs, &c. &c.) formed a very pleasing and grand appearance. I returned to Milum at 6h. 25m. P. M., and found matters progressing; likely to ensure my departure upwards to-morrow morning.

The only weighing implement I have seen this side of Muunsharee was a steel-yard at Milum, and I was told that it came from Tibet, where they are commonly used.

28th May.—Up at 4h. 20m. A. M., ther. 49° in the sleeping room, morning tolerably clear and mild. Much delay occurred in loading the jooboos, but at last all was ready, and I started for Doong at 6h.

25m. A. M. I had with me two servants, (a kitmutgur and shikaree boy,) my bedding, (no bed,) some clothes, powder and ball, a little wine, &c., and very scant preparations for eating, the whole calculated for an eight days' trip. Nagoo Boora, Dhunsing, Geitsing, a road chuprassee, and the Luspa shikaree, with four coolies, (hired at four annas a day each after much bargaining,) accompanied me. We had fifteen jooboos; viz. six for riding on, and nine for three tents, my bedding and clothes, wood, &c. Two of these were very lightly laden, in order to bring back any skins or horns I might procure. One of the coolies carried my wines cheroots, &c., a very light load, and the articles not packed upon the jooboos. I had a sore heel from the shooting excursion of 26th, and could not walk without feeling much pain, I therefore started in the *dandee*; but the road was so infamously bad, that I was soon compelled to walk as best I could. At 7h. 7m. came to the first snow-bed over the Goonka river; at 8h. 20m. near Lungon river saw two *burral*, but they were some distance up the hill, and saw us approach, when they immediately ascended and disappeared over the crest. The sun was powerful, and my heel very sore, so that I did not incline to follow these *burral* even had the hill been easy, instead of being almost inaccessible. At 8h. 55m. reached the Sungon Nuddee coming down from the East, two magnificent snowy peaks were visible in the direction of its source. This small Nuddee has salt, or something of the kind, on its banks a short way up, and *burral* resort there, before the passage of sheep and goats upwards drives them to more remote places. Probably had I been here early in the morning, the two *burral* I saw, would have been feeding near the Nuddee, and afforded an easy shot. I crossed the Sungon by a small temporary bridge, and halted at 9h. 5m. for the jooboos to come up, feeling very tired; sun unpleasantly warm to the skin, though not high I fancy in actual temperature. I started again at 9h. 30m. and at 10h. 15m. reached Tulla Sulong, a small rather level spot, furnishing a little grass. Halted here to breakfast, and let the jooboos feed before moving on to Doong, where there is no pasturage for cattle. Slept till half-past twelve, when breakfast was ready. A strong South wind blowing, with dust in abundance. Opposite Sulong, on the right bank of Goonka (West) is a tolerable waterfall, or rather series of cascades from the top to the bottom of hill. The road thus far, (alternately on



either bank of the Goonka, but chiefly on the left,) infamously bad. The hills on either side a series of dreary looking landslips or bare sheets of rock; and in the rains, when Bhoteas travel up and down, this road must be really dangerous from constant landslips and falling in of the banks. Hardly any snow visible on the hill sides; and Oonta Dhura itself is nearly equally bare, if it is the hill pointed out to me when about half way. Ther. 77° in tent, at 1h. 30m. P. M.

Riding a jooboo is by no means a bad mode of travelling. You sit comfortably in a high demi-pack saddle,\* which affords a capital hold in front; a man leads the jooboo by a string passed through its nose; and the pace though slow is very sure; two or three times during this trip my jooboo fell, but no harm was done. In general, it is wonderful what difficult ground they will carry a man over. Jooboos laden in fifty minutes, and we started again at 3 P. M. Weather had become cloudy and cold. At 4h. 40m. crossed to right bank of Goonka river by a natural bridge formed by three rocks, with fissures filled in by loose stones where requisite, and at 4h. 45m. halted at Doong, (no village,) a little West of the junction of the Goonka and Lusher rivers, which come down from the N. W. and N. E. respectively. The Goonka is covered by a huge mass of ice and stones, 4 or 500 yards higher up; and so doubtless is the Lusher, though not where it is visible from Doong. Road very bad; hills on either side nothing but landslips or bare precipices, with very little snow visible. I had one fine view during the afternoon march of a huge mass of ice in the most fantastic shapes, behind three peaks West of the Goonka; but with this exception, the prospect everywhere was most desolate, and above Doong, it is, if possible, more so. Not a shrub, and hardly a blade of grass visible any where. One eagle, two or three of the chough birds, and as many smaller birds, were all the signs of life met with. There was formerly a shorter road to Chirchun up the Lusher river, but it has been abandoned as too dangerous from new snow covering fissures in the old ice, and yielding when trod on, thus instantaneously precipitating man and beast down a narrow fissure, heaven only knows how deep. Latterly, when men have attempted this route, they did so with

\* The pack saddle used for jooboos is an excellent one; and I took one down as a pattern, in event of one's requiring to use bullocks or ponies as baggage animals.

a stout long stick tied to the waist, in order to catch the sides of fissures, and thus afford a chance of getting out again. This might answer when the stick happened to be transversely to the fissure; but when lengthwise with it, would be no avail. I suggested an improvement to Nagoo, (who told me this,) viz. tying two sticks cross-wise to the waist, and thus ensuring that one of them would catch the side of the fissure whichever way it ran; but these sticks would be a most awkward incumbrance to walking in such hills. Just as we reached Doong, two or three men were seen in the distance going towards the Pass. They would sleep on the road if unable to cross before dark; but the very circumstance of their attempting the Pass at so late an hour, would seem to prove, that its difficulties have been much overstated. I shall (D. V.) be however more qualified to judge by this time to-morrow. At 5h. 55m. P. M. ther.  $52\frac{1}{2}^{\circ}$  in open air, boiled at  $188\frac{1}{2}^{\circ}$ , elevation (by Barron\*) 14,523. Surely this is too much.? The rate of travelling to-day may have been  $2\frac{1}{4}$  to  $2\frac{1}{2}$  miles an hour.

29th May.—Up at 4h. 30m. A. M., after a very bad night's rest. Ther.  $35^{\circ}$  in sleeping tent; boiled at  $189^{\circ}$ , which would reduce the elevation, noted from Doong yesterday, to 14,214 feet. Started at 5h. 10m., morning deliciously clear, but very cold with a light West wind. Ascent till 6h. 15m. up mass of ice and stones, close under hill to N.E., quite bare of snow. The hills to S.W. from a quarter to half a mile distant being tolerably covered with snow. The top of this ascent is where Batten turned back, yesterday twelve month, on account of snow falling and being thick all round. What a contrast to this year! From 6h. 15m. to 6h. 45m., a slight descent, and then along level snow-beds with the Goonka river, now a very small stream, flowing on my left. There had been very hard frost during the night, and every little pool of water was covered with from a quarter to half an inch of ice. Snow very firm and crisp. I had walked for the three-quarters of an hour, and now halted for the people to come up. Started again at 6h. 55m. up a steep ascent of loose stones, &c. (called Bumras;) reached the top at 7h. 15m. and then turned to the right Eastward. Some fine masses of ice on hill to left or West. The soil

\* Mr. Barron of Shahjehanpoor, a great traveller in the hills, gave Lieut. Weller some table for calculating heights by the boiling temperature, and this is always alluded to.—J. H. B.

on the top of Bhumras, and in advance, almost black. Oonta Dhura was visible after turning Eastward, and seemed to be a low black hill, of moderate steepness, with more soil than snow visible. But its continuations East and West were finely covered with snow. Continuous though not steep ascent till 8 o'clock, when I reached the foot of Oonta Dhura, (called Oonta ke Jum,) where people generally halt before cresting the Pass. A small rill of water goes down to the S. W., and probably forms the source of the Goonka river. Road (or track) thus far chiefly over snow-beds, said to cover enormous masses of ice; these melt and split into fissures during the rains, causing much inconvenience and danger to travellers.

I resolved on walking over the Pass to ascertain how my breathing would be affected; and started without making any halt at the foot. The ascent was longer than I expected, but I walked very slowly, halting every now and then for a second or two, so as not to lose my wind, and at 9h. 15m. A. M., reached the summit. The hill side was very wet, but whether from snow recently melted, or from springs below the surface, I know not. During the ascent, I certainly felt my breathing slightly affected, and had I walked fast the affection would probably have been severe. In going over the Luspa hill on the 24th instant, I felt much greater distress, but there I travelled quickly, and the sun was more powerful. During my ascent of Oonta, the sun shone out with great splendour; and the dazzling brilliancy of the snow on either side was truly wonderful. I had never seen or imagined any thing comparable to it, what then must be the effect when nothing but snow is visible in every direction? The Bootees all put on thin horse hair spectacles. I had on a pair, and a green veil also, but my eyes soon became painful, and I was almost stupid from pain before reaching the halting place of Topee Doonga. What may be the difficulties of this Pass after a severe winter, I of course cannot judge; but it would be absurd to speak of difficulties this year, (except the minor ones of cold and glare); and I feel certain that I could walk from Milum to the summit of Oonta Dhura in one day; the only drawback being the fearfully bad road.\*

\* At the foot of Oonta, snow pheasants (huoneal or huonwal) were calling, but high up in the snow. It is hard to imagine what these birds live on, there not being a berry or particle of vegetation for miles round. Yesterday a man brought me seven

On the Pass the ther. when taken from its case was  $45^{\circ}$ . It rose in the sun to  $61^{\circ}$ , and boiled at  $182^{\circ}$ , or a little under, snow being used instead of water. The elevation by Barron's rule would be 18,540 feet; but this must be greatly in excess. There are five small ridges of stone in the crest, which look like pillars from below. It is believed that a ghost kills any one who sleeps near them; but more probably cold is the agent. There was a bitter cold wind blowing, and it is described as awful towards the end of the rains. Dhunsing told me, that in September twenty-five years ago, he lost 120 sheep swept over the North face of the Pass by the wind. His servants escaped to Milum with great difficulty; and the borax with which the sheep had been laden, was recovered next season. The south face and crest of the Pass consist of a black soil, apparently the detritus of a black slate, which latter is visible here and there below the soil. I was much disappointed with the crest of the Pass. The view South is very limited. Nundi Devi not visible, North-East and North a few hills are visible, North-west is a sea of hills moderately covered with snow, and hardly any of them appearing of great elevation. Indeed, were it not for the Louka river, (a small stream,) rising at the foot of the North slope, and flowing due North, I should have been sceptical as to standing on the crest of one of the few Passes into Tibet, and the highest one too. North-east are three bare hills, the first called Gentee, with behind it, not visible, two other hills, which have to be passed on the direct route to Chirchan. I know not what is the name of the centre hill, the third is Chingoor. North, in the distance, is the Balcha ridge, the last range between Hindoostan and Tibet, with intermediately a high gorge above (south of) Chingoor, connecting the hills East and West. From North to nearly West, there is a decent assemblage of hills well covered with snow, (those N. E. and N. having very little). The highest of these is a conical peak above (North of) Gertee, where copper\* is said to be found. This peak bears about due N. W. from the crest of the Pass. Girttee is on the road from Mularee below the Neetee Pass, but to reach either Gertee, Mularee or Neetee

eggs from the nest of one of these birds, and wanted me to eat them. I declined this, and he enjoyed them for his own dinner, cooked up somehow with ghee. The eggs were nearly as large as turkey's eggs, white, with lightish-brown spots all over.

\* There are lead mines at Ghentee.—J. H. B.



from Jawahur, without going round by the South, you must cross Oonta Dhura, of which I was not before aware. At 10h. 10m. A. M., I commenced descending the North slope of Oonta Dhura, one unbroken sheet of steep snow till 10h. 37m. Thence moderate descent, chiefly over snow-beds cut into most troublesome ridges by the wind, till 11h. 35m., when I crossed to left bank of Louka river. Continued along this bank over snow-beds and bare hill sides, till 12h. 45m., then turned sharp to left (West,) and after the worst descent I have yet had, through snow and slush, reached Topee Doongah. Halting place (no village) at 12h. 58m. awfully tired; face blistered by sun and wind, and eyes very painful. Topee Doonga is a small level spot on the left (South) bank of Louka river, which latter turns to the West where I did, being joined there by the Doldunkur Nuddee coming from East, between the second and third hills, noted as visible to N. E. from the crest of the Pass. There is a little herbage at Topee Doonga, and further West, grass and low brushwood (on the opposite side) are tolerably plentiful. South, the hill sides are covered with snow, and recede gently for a short distance North; across the river is one bare precipitous sheet of rock, with landslips along the base. East is the West face of the second hill mentioned above, equally bare and precipitous, with the Doldunkur Nuddee coming down between its North, and the South side of Chingoor hill. West, about three-quarters of a mile down, the united Louka and Doldunkur streams are joined by the Torgurh Nuddee coming down from S. E. by S. These united, flow on Westwards, through a wide gravelly channel to Gertee, where another stream joins, and the whole flow on to Mularee, Josee Muth, &c., forming I imagine the Geenthee river, marked in sheet sixty-six of Indian Atlas. The junction of the Torgurh and Louka is curious.

They flow nearly parallel for some hundred yards before the junction, the former along the top, and the latter along the base of a precipice, which may be 150 yards high at its highest point, and diminishes to nothing at the junction. At 6h. 30m. P. M. ther.  $48^{\circ}$ , boiled at  $186\frac{1}{2}$  or  $187^{\circ}$ . Next morning at 5h. 30m. A. M. ther.  $28^{\circ}$ , boiled at  $186\frac{1}{2}$  or  $187\frac{1}{2}$ ; elevation of Topee Doong (a bitter cold place) from 15,759 to 15,450 feet by Barron's rule.

30th May—Up at 5 A. M. ther.  $27^{\circ}$ \* in my sleeping tent, but as there

\* Compare with Calcutta same hour and same date.—J. H. B. Probably not below  $85^{\circ}$ —Ed.

was no wind, I did not feel the cold so much as on the top of Oonta Dhura yesterday, where the ther. was 61°. Saw a large raven (size of the English raven, or very near it;) but could not get a shot at him. Started at 6h. 50m. A. M., descended to river, then turned up East along it, and at 7h. 8m. A. M. crossed the Louka, just above its junction with Doldunka, stream rapid, but not above knee-deep, and some twenty feet wide. An East wind had sprung up about starting time, and brought intense cold with it. Shortly after the wind lulled, heavy clouds to N. W. and South, and a light snow falling, and continued up the Doldunka, chiefly flowing under snow between two steep sheets of rock, till 7h. 35m., then turned up left (North) to the Kalee Mutteea Churhai; very steep, covered with loose stones over a black crumbling slate. The latter part of ascent was less steep, but without holding on by a jooboo's tail, the whole of it would have been a most tedious job. I picked up a few bad fossils by the way; also pieces of a thin cylindrical slate-coloured stuff, called *doda ka puthur*, (milk stones) and used by the Booteas as an application to swelled nipples in women. Reached top of ascent at 9h. 15m. (This is the intermediate gorge mentioned as visible from Oonta Dhura.) Occasional snow beds during the latter part, hills on either side bare precipitous sheets of sand-stone. Had a good view of Oonta, and took a rough sketch, to be perfected hereafter, perhaps.\* The crest is composed of small loose stones rising in a sweep to the top of the hills on either side (East and West) North beyond a good extent of valley and low hills covered with brush-wood, rises the Buloha range, beyond which are the plains of Tibet. This range is here and there streaked with snow. The hills from Oonta, thus far, seem chiefly of brown sand-stone. The strata mostly dip East, and are very vertical. I observed some strata here and there. On the crest here I picked up a good sized piece of white alabaster-looking stone, very soft. The Booteas consider it of value, call it *huon phool*, (snow flower,) and dissolve it in water with two or three medicines as a lotion for sore eyes, &c. &c. Commenced the descent to Chingoor, (a halting place only,) at 9h. 40m.; route lay about due North over alternate snow-beds and loose stones from the hill above (E.); and was bounded E. and W. by two high ranges of (I think)

\* See Sketch.

bare sand-stone, with a small stream flowing North in the hollow between them, chiefly under snow-beds. The hills on either side are perpetually crumbling away, thus forming immense heaps of loose stones all along their bases. There was a good deal of snow on the North slopes of the ravines (or khunds) and otherwise the prospect was extremely desolate. At 11h. 55m. reached Chingnoo, after a most tiresome and hot descent. Nagoo, &c. wanted to go further, as but very scanty forage was procurable here for the cattle, (the first vegetation we had met with since morning); but I was quite tired and would go no further before eating something. Chingnoo is a small level spot on the right or East bank of the stream noted above; and on the left or South bank of another stream coming down from the East, and joining the former one here. The united streams turn West a mile or two in advance, and eventually join the Louka, &c. by a cut through the hills near Gertee. Just north of Chingnoo, across the stream, a succession of low hills commence extending northwards to the river below Lufkhel. These are covered with a low creeping thorn, (called *damah*,) which is found to within two or three miles of Milum; and the hollows afford very good pasturage. Just as we approached Chingnoo, the Lama, (who had been encamped somewhere near us at Topee Doonga yesterday,) was seen starting on his march from Chingnoo, with his small party, seven or eight men, and half a dozen ponies. These ponies must be really good ones to have come thus far without accident; but they were knocked up by the Pass, and compelled the Lama to halt yesterday. This was very fortunate, for I cannot attribute the Lama's sudden departure from Milum to any thing but fear of my crossing the Pass; or to a desire of stopping me by going ahead, and giving information. After breakfast, we shall move on until we come up with his party; and then by counting his people morning and evening, all fear of annoyance will be obviated. Eloquence will also be exerted to convince the Lama, how unjust it would be to cause me trouble after the kind reception he met with in our territory; and he will be threatened with non-admission into our provinces again, should he cause the Booteas trouble on my account; so I hope we may manage him yet. Altogether though, I do not quite like the state of affairs, and glad enough shall I be to find myself safe again at Milum, after a view of Tibet, and a little of the glorious sporting

said to abound hereabouts. "*Rheow* is the talismanic word to make a jooboo quicken his pace, though a whip has better effect. Safe as they are, my jooboo has fallen three times with me ; but no where in very dangerous places, and no harm done.

Snow-beds are always most difficult at the sides, the middle being generally firm and hard.

Pace to-day one and half mile an hour, or possibly a little more on the whole. Yesterday one and quarter to one and half mile ; and the day before about two and half miles an hour.

Booteea tents all blanket, or upper part blanket and lower part cloth. A strip of about six inches wide is left open along the top to let smoke out, the rains never being heavy enough to cause inconvenience from such an opening. Dhun Sing tells me, that just now it is so hot below Dhapa, that sealing wax melts if carried on the person during the day!!!(?) The appearance of hills looking at them from South and from North is widely different. Looking from the South, you see only the South face of ravines, &c., on which hardly a trace of snow will be visible. But looking from the North, you see only the North slopes ; and these are generally covered with snow, giving the entire hill the appearance of being so covered.

At Topee Doonga this morning, I saw a tolerable number of larks, or some small bird of this sort ; also one or two of the small purple black birds, a specimen of which I unfortunately failed to procure. At Chingnoo, several choughs were flying about ; their call exactly like the cat-call used by young blackguards at home. At Chingnoo, were numerous burrows of the "*pfheaf*." This animal is described as smaller than a dog, of a reddish colour, sits up at the mouth of his burrow, and remains dormant in the winter. It must be a squirrel ; much to my vexation I failed in even getting a sight of one. At Chingnoo 2h. 30m. P. M. ther. 68° in shade of tent, boiled at 186½ or 187° elevation (by Barron,) 15,759 to 15,450 feet.

30th May.—At 3h. 25m. P. M., the servants started for Lufkhel, and I went with Nagoo across the Chingnoo stream, and along its west bank to look for *burrul*. After some time, I saw three on the hill side, a long way off and far up ; had a long sneak, but found the hill side so steep, that when within fifty yards of the *burrul*, I could not depress my gun sufficiently to fire at them standing under a rock. They



immediately got sight of me and rushed off, so I only had one long running shot, and missed. We then turned down into the bed of the stream, and walked for some distance along the snow-beds covering it, between high steep cliffs. No more *burrals*, however, were visible, and it became time to move on. Turned up East over some low hillocks, most pleasantly covered with stunted palm trees\* in flower. The low close thorn also in flower, yellow-shaped, like sweet pea flower†. Now and then the iris of deep or pale blue color, a sort of wild garlic which the Bhooteas eat, in appearance just like iris or narcissus shoots; "*dooloo*," I think *rhubarb*,‡ and most delicious looking emerald colored young grasses, fringing little rills of water flowing between the hillocks. Hereabouts I saw a small dry water-course coming from the top of a low isolated black hill (bare;) in the bed of this were numerous salagrams, which had evidently been washed from the soil during rain. I picked up thirty or forty, and could have found hundreds, but time admitted not. Very few of the specimens were perfect, as they get broken when rolled down by the stream; but I should think perfect specimens could be obtained by digging. Salagrams are formed by an incrustation of (probably lime) stone enclosing the ammonite in a spherical shape, of all sizes, from a marble to a man's head nearly. These cases as it were, burst either from some agency within themselves, or on being set in motion by water falling, &c. and display the fossils. Yet among the numbers that I broke, (they were very hard,) I never found a decent specimen inside, and rarely even the trace of one. In all of these I suppose the originally enclosed shell must have been decomposed and absorbed by some peculiarity in the chemical nature of the enclosing mass. After continuing East for some distance over the same kind of ground, (said to be usually a favorite resort of *burrals*, though none were visible at the time,) I came upon the road to Lufkhel; and while descending to the river saw a little East of the road, a small triangular sheet of deep blue water, perhaps eighty yards long each side. North (in advance) across the river about a mile off, another sheet of water was visible, less darkly colored than this; two or three rills of water flowed down along East

\* Probably a kind of willow is here meant.

† Tartaric furze and juniper bushes are the thorny plants in the Passes.

‡ Yes.—J. H. B.

of road to the river, the bed of which, including debouchements of these rills, is fully half a mile wide, formed of loose stones and gravel.

At 6h. 55m. p. m., reached the river flowing from East nearly due West, and joining the Chingnoo stream about a mile or less below Lurkhel, after passing through a magnificently bold cleft in the hill of solid rock for many hundred feet of perpendicular height. This river comes from the hill North of Lufkhel in several small streams. These unite somewhere to the East, and had been swollen, either by rain or some other cause into a rapid torrent thirty or forty yards wide, through which the jooboos carried us with very great difficulty. In fact it was dangerous work, but this rapid rise will probably decrease very speedily, as the river is usually fordable by sheep. I reached Lufkhel at 7h. 10m. a. m., much fatigued. This is a pretty halting place (no village) a few hundred feet above the river, shut in by an amphitheatre of low hills, which form the base of the last range before Thibet. The thorn bush (damah) is tolerably abundant, and the hollows are covered with deliciously emerald-colored young grasses. The place is a favorite pasturage, and during the rains some of the nearest Thibet villagers pitch their tents here. Lufkhel and Topee Doongah were the refuge of numerous Thibetans, when the Seiks advanced last year.

My servants and jooboos had arrived sometime before me, after two and three quarter hours' travelling from Chingnoo.\* Their road was excellent, and lay over a succession of the small hillocks I have described. The Lama was encamped at Lufkhel in a great state of alarm, and very indignant with Nagoo and Dhunsing, (whom he knew well),

\* At and about Chingnoo, there is a little grass for cattle, and I found one salgram here. I saw also the foot-print of an animal called "*chunkoo*." This I had supposed to be a small tiger, but from subsequent description of the color, hunting in packs, and lolling out the tongue when fatigued, it must be the wolf, and judging from the foot-prints, of large size. The "*chunkoo*" will kill jooboos, also whole flocks of sheep and goats if left untended. It also hunts the *burral*, but is said never to attack a man. The "*thurwah*," is a smaller animal, slightly marked like a tiger, and hunts singly. (Perhaps *Felis macrocelis* hitherto supposed to be confined to Sumatra, but of which a specimen has just been received in our Museum from E. B. Ryan, Esq. who obtained it at Darjeeling. Eds.) Possibly I may yet see these animals. The two streams at Chingnoo have rather wide gravel beds, denoting a large body of water at some period of the year.

Much to my surprise, Nagoo informs me, that the jooboo will breed, either male or female, with the cow or bull. The produce is called "*toloo*," is but little used, and I fancy but rare. Nagoo could not tell me where one was to be seen.



for having brought me across the Pass. Fortunately, his people were all present, and Nagoo had no difficulty in persuading him, that I had come solely for shooting, and did not intend to advance further. Two men had just arrived from Dhapa or thereabouts in search of the Lama, bringing ghee and rice for his consumption. Their only news was, that the Lhasa force of from 5 to 7,000 men had moved on Ladakh, where the Seiks continued to hold out, and would probably have reached ere this date. These two men were stupid fellows, and had not been within many days journey of Lhasa, so that their information is deserving of but little credit. The general impression is, that the Lhasa force, even if it has moved, will not be able to capture the citadel of Ladakh from the 300 Seiks holding it.

31st May.—After a horrible night's rest, dreams of wonderful ascents and descents, &c., I rose at 5 A. M. and prepared for a hunt after *burrul*. Ther.  $36^{\circ}$  in sleeping tent, boiled at  $188\frac{1}{2}^{\circ}$ . Elevation 14,523 feet. I crossed the river and ascended a rather steep hill West of the road, when on the other side, much to my delight, I saw five or six *burrul*. The first that caught my eye was lying down at about ninety yards. I took a good aim with the long rifle, and hit him in the middle of the back. He jumped up and stood, the others running off, I fired one barrel of my double gun, (I thought I missed,) the bullet of which entered the jaw a little below the eye, still the *burrul* stood, and it seemed doubtful whether I should get him, though he was pouring blood; but my long rifle was now ready again, and after numerous attempts I was satisfied with the aim, and rolled him over, to my infinite delight, with a ball in the side. Thinking the others might not have gone far, I left the fallen *burrul* where he lay, and ran along the crest of the hill, and on the South face I saw four or five more standing very far down; knowing it would be useless attempting to get nearer, I put up the second sight of my rifle, and took a long steady aim at one standing lengthwise from me. He dropped to the shot hit fairly in the centre of the back, and I do not remember ever to have been so delighted with my shooting. The distance could not have been less than 160 yards. The remainder stood for a second or two, watching this poor brute's struggles to rise, and then made off. Two more, and a herd of seven or eight more made off, so that I had no chance of another shot, and prepared to return, having much

to my delight bagged two *burrals* (my first) by seven o'clock. Returning, I saw a brace of snow pheasants, but could not get near them. These birds in a mild season must be difficult to kill. They shew some white along the wings in flying, are of a good size, and have a melancholy sort of note, which they continue at intervals nearly all day. I got back to Lufkhel at 10h. 30m. much fatigued. Ther. in tent  $87^{\circ}$ ; at 11h. 45m.  $88^{\circ}$ ; and  $90^{\circ}$  at half-past 12; after which it became rapidly cooler. My success with the *burrals* this morning was doubly fortunate, as it convinced the Lama I had really come for shooting, and enabled me to propitiate himself and people by the present of half of one of the *burrals*, which highly delighted them. The Lama foretold I should have success in the morning, and was hugely pleased to see through a small pocket telescope he has, that I had been successful, as I descended the opposite hill in returning. Both *burrals* were females, and had consequently only small horns. The second killed was, I fancy, fully above the average size, and measured as follows:—

	Ft.	In.
Height from hoof to centre of shoulders, .....	2	10
Length from nose to insertion of tail, .....	4	$1\frac{1}{2}$
Girth behind fore legs, .....	3	$1\frac{1}{2}$

Color light brown, and nearly white on the belly. Dark brown stripes down the front of the legs. Hair, something between hair and quills, like what I fancy the softer parts of a porcupine's covering. May be weight about  $1\frac{1}{2}$  maund, just as much as a strong man could carry after the entrails were taken out. But in October, when they are fat, probably some of the large males would weigh  $2\frac{1}{2}$ , or nearly three maunds.

Plenty of salagrams at Lufkhel; maunds could be collected in a day. I should have mentioned that the Lama requested me to take some of his tea this morning. I agreed, and it was served in a quaint copper tea-pot, exactly like an old fashioned coffee-pot. I drank about a pint of the decoction, which was chocolate colored, rather greasy, and of by no means bad flavour, though it had a peculiar twang which I can liken to nothing I remember to have tasted. The soda mixed with the tea is said to color it like brickdust or chocolate. When to be had, both sugar and milk are used with their tea, but this had neither. One of the Lama's men was amusing himself by slinging

stones at ravens and two large vultures during the day, but he did not project the stones with good aim, or to any considerable distance. Perhaps he was a bad hand at it. The sling was made of plaited hair. At 3h. 30m. I started northwards up a gentle ascent or two, (salagram hillocks,) and then turned West over a series of most lovely undulations. Some bare, (salagram hills,) others covered with the thorn bush, and rills of water, with superb pasturage in the hollows between. This style of country extends I know not how far, and might be ridden over at a rapid pace. It is bounded south by the range of hills which I noticed to the N. W. from Oonta Dhoora, particularly mentioning the conical hill above Gertee, which is now nearly as far South as it then appeared N. W. of me. These hills appear very steep and rocky, and shew much snow on their north side. The breadth of this tract may be two or three miles at most, and it is bounded north by the last range before the Thibet plains, rising into bare steep precipices. I was led here by a report that a wild horse had been seen in the morning, but it subsequently appeared, that the man sent to look out, had seen only the hind quarters of a "*neaudh*," and returned at once for fear of disturbing the horse, as he thought it to be. The "*neaudh*" is like the *burral*, only much larger, with enormously thick horns and darkish colored hind quarters. I had a creep of some two hours, after three of them, but never got nearer than from a quarter to half a mile, and at 6 o'clock was forced to give up, with these and a herd of 20 or 30 ahead of me. I believed all along that they were large male *burral*, but Nagoo and Dhunsing, who remained behind with my telescope, swore they saw them to be "*neaudhs*" distinctly, and certainly I observed the dark hind quarters. Though I got no sport, I highly enjoyed this trip, though I suffered from the awful cold wind along the crests in returning. Horse dung (the people said of the wild animal) was abundant; as were also foot marks of the "*chankoo*," or some other beast of prey, nearly the size of a leopard's foot print, and to the circumstance of these latter, animals being about, Nagoo and Dhunsing attributed the unusual scarcity of *burral* in this favorite resort. Occasionally I saw the place where a *burral* most probably had been killed. Got back to the tents at 7h. 15m. very tired. Had some stewed and roasted *burral's* flesh for dinner. The meat brown, and by no means badly flavored, although this is the worst season. Having lived on dhal and rice

since leaving Melum, I enjoyed this meat greatly; but did not sleep well after it. Face almost raw and very painful, with the hurt in my left heel becoming worse daily, I cannot give up the only opportunity I may ever have for shooting, &c. in this part of the country on account of this sore heel, so have cut away the back part of my shoes and boots, and limp along as I best may.

*Bun-chour or Wild Yak.*—This animal is found hereabout in the rains, and one of the Lama's people brought in to-day the horns and skull of a male, which he had killed when going down last year. The horns are short and of good thickness. Forehead unusually wide, and the horns and front part of skull, wanting the lower jaw, are a good load for a man.\*

1st June.—Up at 4h. 20m. after a miserable night's rest, Ther. 31° in sleeping tent, and much the same in open air. Boiled at 188½ to 189°; started at 5h. 50m. with Nagoo and Dhunsing, on jooboos, for the crest of Bulcha ke Dhoora, or last ridge between Oonta Dhoora and the plains of Thibet. At 6h. 30m. travelling about N. E. by N. reached the top of ascent visible from Lufkhel; then turned a little more East, down the gentle descent and along level till 7h. 6m., when we reached the bed of our branch of the river, passing below Lufkhel. This is joined by numerous small streams coming down from the hills East and West, every here and there. Halted from 7h. 6m. to 7h. 15m., then along gentle ascent covered with thorn bushes "damah" and grass, till 8h. 4m., when we reached the foot of Bulcha. The spot where we arrived at the river is called Sungtah, a halting place for sheep, &c. A short distance from it, the river (or stream) divides into two small streams, one coming from about N. W., the other from N. E., and our route was up the latter. The hills on either side were of inconsiderable height, bare, precipitous, and crumbling. But towards the foot of Bulcha, they opened out a little; had a few thorn bushes on the slopes; and where the surface was abraded the soil appeared of a dark brick-dust color. Does this denote volcanic action? I am told the soil is much more extensively and deeply colored at Chungnoo, and near Tirtooporee. Halted to eat biscuits and rest the jooboos from 8h. 4m. to 8h. 33m. Then commenced the ascent, (which proved far

\* The ground I passed over this afternoon, lies on either side of our road to Doongpoo.



more severe than I expected,) and reached the summit at 10h. 24m., having been delayed a few minutes by one of the jooboos turning refractory.\*

On the summit is a small *dehta*, or heap of stones, with two or three pieces of rag tied on sticks, and to this Nagoo and Dhun Sing added a stone or two, they then salamed to the country below, and I began my questions. Instead of a plain which I had expected to see, the country is formed of alternate low hills and table lands, with a range of higher hills (well sprinkled with snow) in the distance, running N. W. to S. E. Missr is at the foot of this range, on the South face; the road from Gurtope to Tuklakote runs along the base of the same face, and it was by this route the Seikhs advanced last year. The Bulcha Pass must be fully as high as Oonta Dhoora; and although the weather was quite mild to-day, Nagoo assured me it was rarely the case, and that the wind and cold of Bulcha were more dreaded than those of Oonta. There was a thick haze Northward, and I could not therefore distinguish any thing clearly with my telescope. Chungnoo is, I believe, the only village to be seen. On the North face of Bulcha, a small stream, the Jhunkoo, rises, flowing North and a little West. This is joined by a stream coming from past Chirchun, and the two united form the Trisum river, which I could see in the distance, flowing North-westerly, a good sized river. To the Southward the peaks of Nundee Devi were visible, the larger one bearing South-west by South, also the Gertee peak S. W. Oonta Dhoora was not visible, being obscured by (I think) the Lavur hill (N.), however, I knew its direction exactly by the neighbouring peaks, and the bearing was due South. Round as far as to the West and a little North, the hills towards Mana were visible. From Bulcha it is two marches to Neetee, the intermediate halting place being Hotee.

<i>Bearing from Bulcha.</i>	<i>Name of Place.</i>	<i>No. of day's journey for laden Sheep.</i>
N. E. a little, N.	Chungnoo,	Three.
N. E.	Missr,	Four.

\* In the valley were a few pigeons and choughs, also the Iris plover. There was a little snow here and there; also in the hill to the East, but none on those to the West. Towards the top of the ascent was a tolerable quantity of snow, but in detached portions.

Bearing from Bulcha.	Name of place.	No. of day' journey for laden Sheep.
North.	Gurtope,	Seven. { Two Gurphun, or Commissioners.
S. E. by E.	Taklakote,	Seven. { A Joompun, (or Jung-pun)*
N. W. by W.	{ Dhapa, Mungnung, Toling Mut, Chuprung, }	Five.—A Joompun.
		Six.
		Seven.
		Eight.—A Joompun.
N. W. a little, W.	Doongpoo,	Two or three.
N.		
N. E. by E.	Kyloss range,	Seven or eight.
E. perhaps a little S. (gneiss,)	Chirchun,	One. { A halting place only, no village.

The view from top of Bulcha was contracted by the slope of the hill East and West just in front, and by the distant haze; no vegetation was visible, and I doubt whether on the clearest day the prospect *as one* would be worth going to look at. From Bulcha it seems as though the hills came out from Oonta Dhoora on either side in the segment of a circle, of which Bulcha is the apex; but I doubt not they would present a similar appearance viewed from other points East and West in advance of the Oonta Dhoora range (as it were); and my previously formed opinion of the Passes being over the last hills between Hindoostan and Thibet, was quite incorrect.

I descended the hill in 45m. ; 34m. more, to where I had met the river in going up; 36m. to the top of the ascent above Lufkhel; and 30m. to Lufkhel: total  $2\frac{1}{4}$  hours, arriving at half-past one. I had expected to see *burrul*, and perhaps the *bun-chour* during this trip, but was disappointed; so at 3 o'clock I started off to yesterday evening's ground to look for the "*neaudhs*" and *burrul* I had seen yesterday. About half-past four, I saw what with great difficulty and the aid of my telescope I made out to be a wild horse ("*cheang*"), probably "wild ass" is the more correct term. This animal seemed about 12 hands high, short and compact, and more like a mule than a horse, particularly about the tail, which with the mane and face, was black, the legs and belly white, and the sides and back a reddish brown. When feed-

\* Joompun—Magistrate and Collectors.



ing, the animal looked much like a small punchy native horse, but when alarmed, he drew the head up so erect, that he looked far more like a *burrall* or *neaudh*, in which its color assisted. The head was rather large, and the forehead broad. This animal proved the most cunning I had ever met, though they are said to be easily approached when in herds. He never stopped in a hollow, but always trotted briskly through to the next eminence, whence he could have a clear view all round. There, if I ran or walked up quickly, he would remain till I came within 150 to 200 yards. But if I did not arrive soon, or attempted to sneak within this distance, he trotted off to another eminence, and so on. Under these circumstances, I was perpetually out of wind, always running or walking fast, and my heart throbbing as though it would burst, so that I had no hope of killing the animal. When I found it impossible to get nearer, I ventured three shots at different times, (shaken as I was, with the second sight of my rifle up) for the mere chance of hitting. My second shot was an inch or so too high, for it grazed his back, and I saw the bullet fall close behind him. He kicked up furiously with both heels, and I flattered myself, was falling; but he trotted away again, to my infinite disappointment. This went on till past sunset, when I was forced to turn homewards, not having seen any other animal during the afternoon. Reached Lufkhel at 8 o'clock, quite fatigued by upwards of  $13\frac{1}{2}$  hours work since morning.

I would have given much for another two days at Lufkhel, but my people were averse to remaining. The Lama also was dreadfully nervous, and irritated at my having gone to Bulcha, as he verily believed I was going on into Thibet, although my servants and tents remained behind. The Lama's people were all present, but the families of some of them were in tents, only seven or eight miles below Bulcha Pass; and as the Doongpoo authorities might by chance have made a dash at me, being not above one day's riding distant, I was compelled to agree upon returning towards Melum on the morrow.

*2nd June.*—Started at 5h. 22m. A. M., intending to have a look at the ground where I killed the *burrall* on the 31st ultimo. Had nearly two hour's fag, and saw not one *burrall*, they appearing to have deserted the spot. I saw altogether five or six brace of snow pheasant, but did not attempt them, being after *burrall*. Had I even done so, I doubt much if I could have got a shot, for they were excessively

watchful. Feeling fatigued from yesterday's hard work, and a very bad night's rest, I mounted my jooboo, and sent the shikaree and boy before to look out; about 8 o'clock one of them returned, having seen four *burrals*. I went on and saw them on a bare hill side, took a long creep to get near them, and found no trace of them when I came up. The boy had, however, seen two go up the hill, and two over the ridge to some cliffs in advance, just East of Chingoor. I therefore ascended again over a rough landslip of hard stones to the crest of the cliff, which was formed of sheets of yellow sandstone and loose masses of the same. This stone so exactly resembled the color of the *burrals*, that I saw nothing; and I was going to look further over, when my boy gave a whistle to recall me. He had seen numerous *burrals* lying about ninety yards in front of me, but the whistle startled them, and the first I saw was then jumping up. I took the best shot I could at one running, and broke his hind leg well up, but did not stop him. The noise alarmed four others that were lying down a little to my right, not fifty yards off, and here another barrel would probably have ensured me a certain hit; but before I could get my double gun, one barrel of which had ball, they were a good 100 yards off, and my shot missed. The herd, consisting of from twenty to twenty-five or thirty, now slowly ascended the ridge of hill to my left, and as I had no chance of seeing them again, I took four or five long shots at them with my rifle as fast as it could be loaded. I might have killed one, as for two shots the distance was not above 200 to 250 yards; but my bullets went only very near, and I could do no damage. All search after the wounded one was ineffectual from the terrific nature of the ground, and a little blood was all the result. My shikaree quite frightened me by some of the sheets of rock he ascended and descended, until I called him away. Some two hours were lost after these *burrals*, and it was 12h. 50m. before we reached the crest above (South of) Chingoor. Thence a quick descent down Kalee Mutteea Churhai to Doldunkur Nuddee by 1h. 35m., thence along the Nuddee to its junction with the Lonka, which latter being much swollen, we halted here (where the Lama was on 29th ultimo,) at 2 p. m. instead of going on to Topee Doonga, which was 18 minutes' travelling to the West, though here grass was very scarce and wood not procurable. The snow in the Nuddee had melted very much since I passed up, and

Oonta Dhoora looking South from the ridge above Chingnoo  
i.e. the crests of Kalee Mooltee Chinhaie



The intermediate hills are chiefly covered with snow but their tops bare

Loose stones rising up to hills on either side, immediately in front is the Kalee mooltee Chinhaie descent looking southwards, which would require deep shading to convey any idea of. Probably from where I stood to the top of the Pass the direct distance may be 10 miles. A few ammonites are to be found along the Kalee mooltee Chinhaie



Looking north from Crest of Kalee mooltee Chinhaie, but this is more of a map than a sketch as beyond the first low hills north of Chingnoo only the Budcha range is seen from where I stood on the Crest. The intermediate river being shut out from view by the said low hills, the other river also is not visible northwards after Junction of Chingnoo stream with it.



some of the snow beds were barely practicable, with no other track except under great difficulty.

The new detachment of troops gone to Ladhak is only 1,000 instead of 5,000, and they are commanded by the chief who takes credit for having annihilated Zorawur Sing last year. These troops are from Gurtope and not Lhasa, though I understand they came from Lhasa some months ago; and there are perhaps 5,000 more ready to advance from Gurtope, if this 1,000 fail. They will get a lesson probably, when Bustee Ram arrives with his Seikhs.\*

3d June.—Started at 4h. 40m. after a bad night's rest, †. Ther. 42° in sleeping tent, morning very mild with dense clouds and haze. Route lay up right bank of Laukon river, and was much easier than that from Topee Doonga would have been. Ascent gentle, except the first part. Road over snow-beds and sides of landslips. At 6h. 15m. reached a small stream coming from East, which may be of considerable size at some time of the year, judging from its bed. At 7h. 26m. at the foot of Oonta Dhoora, and at 8h. 17m. reached the crest, walking up leisurely. On the Pass it was unusually mild—no wind—and haze cleared away; so that I had a good view of whatever is visible from the top. Ther. in shade 39½°. Boiled at 182°. Halted till 9h. 20m., and during the interval, I attempted a sketch of views, north and south, which I must get completed hereafter.‡ Ate a good quantity of biscuits, and drank the health of the Queen and friends.

There is a small sheet of blue water a little west of the foot of the Pass on the north side, but I believe it dries up at some period of the year. On the *debta*,§ two small sticks had been set upright. These were fringed down the south side with what I really took to be fine white cloth, but it turned out to be ice, from the congelation of moisture driven past by the bitter cold north wind. I saw one young swallow flitting about on the crest; what on earth was it doing there?

I have made a mistake I believe regarding the three hills North East of Oonta Dhoora. The nearest is Gentee, but Saour is Eastward of

\* By last account, the Chinese Thibetan forces had been totally routed at Ladhak by the Seikhs, October 14, 1842.—J. H. B.

† Probably the rarity of the air may have had a greater effect on our traveller than (in his note on Manson's Journal) he seems inclined to admit.—J. H. B.

‡ See Plate.

§ Hillock or heap of stones for offerings and worship.



that again, and the name of the second I do not know, (unless it be "Lusher.") Chingoor may be the name of the third, or merely of the ridge above Chingoor. Commenced the descent at 9h. 20m., reached foot at 9h. 55m., Doong at 12h. 15m., breakfasting place of 28th ultimo 2h. 30m., halted till 3h. 15m., and then on to Melum, where I arrived at 5h. 40m., quite exhausted by the 13 hours' travelling. At the foot of the Pass, the snow was melting rapidly, and large fissures were forming, snow very soft, sun unpleasantly hot. Goonka river much swollen since I passed up, and the snow-bed, by which we crossed to Melum side falling in rapidly. My face and heel were exquisitely painful, and I was delighted to get back to Melum for my bed. The price of a yak is from eight to twelve rupees; they carry less than a jooboo, and sometimes turn upon their drivers, or rush down hill when urged beyond their patience; a jooboo never does this, carries  $1\frac{1}{2}$  to 2 maunds well, lives to 30 years or so, and works 12 to 14 years. Dhan Sing is my authority. In descending the Pass yesterday, I heard the fall of an avalanche somewhere in the vicinity; the noise was that of a loud and continued peal of thunder; the Bhooteas have stories of men and goats being lost in snow storms and avalanches. One I heard to-day was of 4 men with 500 sheep and goats lost during a snow storm of 7 days near Sungon. Three men escaped back to Melum, and the tribe of Bhooteas who suffered this heavy loss forswore the Thibetan traffic for ever. Now-a-days, people seem to have become acquainted with the seasons and weather; for accidents very rarely occur.\*

\* A short time after Lieut. Weller's departure from the Bhothe Mahals, I received an official report of two Bhooteas with 8 or 10 loaded jooboos and some sheep being lost in a snow storm. Accidents of this kind are most frequent during the months of May and October; in the former month from the fall of avalanches, both of snow and rocks occurring in the middle of the day when the sun becomes powerful, and the masses on the peaks become loosened, in the latter month from the first falls of new snow at the commencement of the winter surprising parties who attempt for the sake of profit to prolong the season of traffic across the Passes. In October 1837, the Netee Pass was quite open on the 11th, on the 12th it was entirely closed by a sudden snow storm of which I was an eye-witness. The village of Macca near Budrinath has been twice carried away by avalanches since 1815, and the pilgrims who venture to Keddernath too early in the month of May, are sometimes surprised by avalanches falling in the three miles between Gowree Koond and the temple; the only signs of them left being sticks and shoes scattered about the snow. Common caution as to choice of season would save all such accidents to the pilgrims; indeed, accidents are yearly becoming of rarer occurrence.—J. H. B.



*A perpetual Moon Table, By Capt. ROBT. SHORTREDE, 1st Assist.  
G. T. S. ; F. R. A. S. &c. With plates.*

I now send an account of a Table, which I have constructed for finding the Moon's age for any date, past or future, somewhat similar to that lately published for finding the week days.

If the Moon's course were completed in an even number of days, and with a uniform motion, its age and the time of any particular phase would be found as readily and surely as the day of the week ; but as neither of these conditions holds good, and as two lunations are scarcely ever completed in equal times, if we wish to be correct, we must either make a calculation at length, or avail ourselves of those already made, or else use some other method by which correctness is made to give way to convenience.

The rule commonly given in books of Astronomy for finding the Moon's age is by no means very simple, as it requires us first to know the Golden Number and the Epact. The rule for finding the Golden Number is tolerably simple, as also is that for the Epact at present, but for this, after 1900, a new rule is necessary, which as given in Barlow's Dictionary, runs thus: ' Divide the centuries of the given year by 4, multiply the remainder by 17 ; then to this product add 43 times the quotient, and also the number 86, and divide the whole sum by 25, reserving the quotient : next multiply the Golden Number by 11, and from the product subtract the reserved quotient, so shall the remainder after rejecting all the 30's contained in it, be the Epact sought.' This rule is such that few persons will be inclined to use it, except in cases of urgent necessity, and even by means of it the Moon's age may fall on the wrong day, as no account is taken of the great Equations depending on excentricity, which may amount at a maximum to 14 hours on either side of the mean time given by the Tables.

The Table now given shews at once, without calculation, and with scarcely any trouble, the mean times of New and Full Moon, &c., as also the Moon's age to the nearest day, and by means of another similar card for the two principal corrections, the true times of New and Full Moon may be found within an hour or so of the results, which would be found by a detailed calculation.

In constructing this Table, I have used methods of approximation more or less exact, according to the exigency of the case, so as to retain as much correctness as is consistent with convenience, and also to allow of the admitted errors being corrected in the least troublesome way I could devise.

A mean lunation consists of 29d. 12h. 44m. 03s.\* If this be supposed to occupy the circumference of a circle, it will, when divided into days, have 29 parts each equal to a day, and a space corresponding to 44m. 03s. more than half a day. It will, however, be vastly more convenient to divide the circumference into  $29\frac{1}{2}$  equal parts, each of which will correspond to 89.593s. or about 1m. 30s. more than a day, but in ordinary cases of finding the Moon's age, or time of New Moon, &c. the small quantity by which the subdivisions exceed the exact value of a day, may be disregarded without inconvenience.

The days of the month are written in order from right to left on the inner card, which of course contains  $29\frac{1}{2}$  divisions, corresponding to those of the lunation; the days beyond 29 being written intermediately to those at the beginning of the month.

As January contains 31 days, or nearly  $1\frac{1}{2}$  day more than a lunation, the next month February is written to the left of January by a corresponding quantity. February having only 28 days, falls short of a lunation by nearly  $1\frac{1}{2}$  day, and hence March is written to the right of February, and would fall exactly under January if the lunation contained exactly  $29\frac{1}{2}$  days. In like manner April falls nearly under February; and May near half a day to the left of April; and so on, each month falling to the left by a quantity corresponding to the Epact of the preceding month. If the lunation contained exactly  $29\frac{1}{2}$  days, December would fall  $9\frac{1}{2}$  days to the left of January, but this must be diminished by 11 times, 44m. 03s. = 8h. 04m. 33s., leaving 9d. 3h. 55m. 27s., and if this be estimated by the scale of the Table, it

\* In most modern works the lunation is stated at 29d. 12h. 44m. 02.8s. This number is given under *Moon* in Barlow's Dictionary, while on the opposite page a *lunar month* or *lunation* is stated at 29d. 12h. 44m. 03s. 11t. This latter quantity agrees best with the ancient observations, and the former quantity with the modern. The quantity here used is pretty nearly the mean of the two, and is that usually given in common works. The difference of 2-10th of a second on each lunation amounts in 4000 years to about 2h. 44m. 54s., and therefore in a Table like the present, scarcely requires farther notice.

should be farther diminished at the rate of 89.50s. daily, which amounts to 13m. 40s., giving a result of 9d. 3h. 41m. 47s. It would simplify the apportionment of this difference, without giving rise to sensible error on this scale to reckon it at 45m. 1-16th of half a day on each month. The exact position of the month marks, are in half days as in the following Table :—

January, {	0 <sup>00</sup> 2 <sup>00</sup>	May, . . .	55 <sup>2</sup>	September, 45 <sup>63</sup>
February, {	56 <sup>09</sup> 58 <sup>09</sup>	June, ..	52 <sup>3</sup>	October,.. 44 <sup>70</sup>
March, ..	00 <sup>12</sup>	July,...	51 <sup>45</sup>	November, 41 <sup>79</sup>
April, ....	56 <sup>21</sup>	August .	48 <sup>54</sup>	December, 40 <sup>86</sup>

The outer card contains the years of a century in their order, from left to right, at intervals, corresponding to the annual Epacts.

A tropical year consists of 365d. 5h. 48m. 51s.\* nearly, and in 12 lunations there are 354d. 8h. 48m. 36s., the difference between which is 10d. 21h. 00m. 15s., which may be called the tropical Epact. If the Calendar were kept in tropical years, this would be the constant annual Epact; but in order to correspond with the Calendar years, this tropical Epact should be diminished by 6h. for 3 years, and in the 4th year should have a day more than in the three preceding. They would then consist of 10d. 15h. 00m. 15s. and 11d. 15h. 00m. 15s. respectively. To reduce these Epacts to the scale of lunation days, they must be diminished at the rate of 89s., 50 daily, or 15m. 40.93s. and 17m. 10.44s. or 15m. 58.33s. at an average: these become thus 10d. 14h. 44m. 34s. and 11d. 14h. 43m. 04.5s. These would be the quantities by which the years on the outer card advance to the right of those preceding them, if it were true that a day is gained in every 4 years; but the error on this supposition reduces the average correction as above to about 4m. 50s. on each year.

The following considerations will, however, somewhat simplify the mode of writing the years in their order. In 1236 lunations, there are 36,499 days, 19h. 25m. 48s., in a Gregorian Century there are 36,524 days; being in excess of the lunations by 24d. 4h. 34m. 12s. This may be called the Gregorian century Epact. If the years of the century

\* This quantity is given with some variation by different Astronomers. The above is the value towards which Delambre seemed to incline. The difference of a second or two is of no importance as regards the Table.

be written out on the card at intervals of 10d. 15h. and 11d. 15h. a Gregorian Century will consist of 1236 lunations, 24 days and 12 hours. In order to compare these results, the 24d. 12h. must be increased at the rate of 89.593s. daily, or the 24d. 4h. 34m. 12s. must be decreased at the rate of 89.500 daily, to have them in common or lunation days respectively. The latter will be the more convenient, as the adjustment is to be made on the card which has lunation days; the correction to be subtracted from 24d. 4h. 34m. 12s. is 36m. 05s. which leaves 24d. 3h. 58m. 07s. as the Gregorian Century Epact on days of  $29\frac{1}{2}$  to a lunation, the difference between which and the 24d. 12h. given by the card or 8h. 01m. 53s. is the error generated in a Gregorian Century by using the Epacts 10d. 15h. and 11d. 15h. Now this quantity is as nearly as may be  $\frac{200}{3}$  or 67 p. c. of half a day, and being distributed over the whole century, becomes  $\frac{2}{3}$  p. c. of half a day for each year. The odd 15h. of the Epact is half a day, and  $\frac{1}{4}$  or 25 p. c. of half a day. Hence counting by the 59 half days, and beginning at 00 the year, 01 will stand at  $21.25 = \frac{2}{3} = 21.24$  to the right of zero: the year 02 at 2 ( $21.25 - \frac{2}{3}$ ) = 42.49 and the year 03 at 3 ( $21.25 \times \frac{2}{3}$ ) = 63.73 = 4.73 after rejecting 59 or a whole circumference. In this manner the following Table was made:—

TABLE I.

Year.	Place on the Card.	Year.	Place on the Card.	Year.	Place on the Card.	Year.	Place on the Card.	Year.	Place on the Card.	Year.	Place on the Card.
00	57.00	19	57.62	38	58.25	57	58.87	76	0.49	96	20.36
01	00.00	20		39	20.49	58	21.11	77	21.74		22.36
02	21.24	21	21.87			59	42.36	78	42.98	97	43.60
03	42.49	22	43.11	40	43.73			79	5.22	98	5.85
04	4.73	23	35.35	41	5.98	60	6.60			99	27.09
05	27.97	24	26.60	42	27.22	61	27.84	80	28.47	100	48.33
06	49.21	25	49.84	43	48.40	62	49.09	81	49.73		50.
07	11.46	26	12.08	44	12.71	63	11.33	82	11.93		
08	32.70	27	33.33	45	33.95	64	34.57	83	33.20		
09	54.57	28	54.57	46	55.19	65	55.81	84	56.44		
10	55.95	29	18.81	47	17.44	66	18.06	85	18.68		
11	18.19	30	40.06	48	40.68	67	39.30	86	39.93		
12	39.43	31	2.30	49	2.92	68	3.55	87	2.17		
13	1.68	32	23.54	50	24.17	69	24.79	88	25.41		
14	24.92	33	46.79	51	45.41	70	46.03	89	46.66		
15	46.16	34	9.03	52	9.65	71	8.28	90	8.90		
16	8.41	35	30.27	53	30.90	72	31.52	91	30.14		
17	29.65	36	51.52	54	52.14	73	52.76	92	53.39		
18	52.89	37	15.76	55	14.38	74	15.01	93	15.63		
	15.14		37.00	56	35.63	75	36.25	94	36.87		
	36.38			57	37.63	76	57.49	95	58.11		

The years being written in their places shew very plainly the Metonic Cycle of 19 and the Calippian of 76 years. That of Meton is well known as the Golden Number.

Cycles of 11, 8, and 3 years may also be observed, and the order of their succession is worthy of being kept in mind as helping to find readily the place of any required year on the card.

A little practice will shew the value of this remark, and besides it, no other seems necessary.



The middle card has on its inner circle the days of the Moon's age, and the known characters for New and Full Moon, and for First and Last Quarters ; on the outer circles are the full centuries of Old and New style. The manner of writing the days of the Moon's age is obvious enough, and requires no explanation. That of writing the full centuries is now to be shewn.

The Gregorian Century Epact being 24d. 4h. 34m. 12s., the Julian Epact is 25d. 4h. 34m. 12s., and by intervals corresponding to these times will these centuries follow each other towards the right. But as these quantities are much greater than half a lunation, they may be subtracted from 29d. 12h. 44m. 03s., and the remainders 5d. 8h. 09m. 51s. and 4d. 8h. 09.51s. will be the intervals of the successive centuries towards the left. These being in common time are to be reduced to that of the card at the rate at 89.50s. daily, as formerly shewn, when they become 5d. 8h. 01m. 53s. and 4d. 8h. 03m. 22.5s. respectively. If these be taken at 5d. 8h. and 4d. 8h. by neglecting the small excess the error in 400 years will be 9m. 01.7s. and in 4000 years only 1h. 30m. 27s. For the last 4000 years this error would be rather convenient than otherwise, as tending to neutralize that arising from neglecting the acceleration, which for the same period, as already stated, would be about 2h. 44m. 54s. the difference between which and the quantity now omitted being 1h. 14m. 27s.\*

New style centuries may be carried forward at the same rates of 5d. 8h. and 4d. 8h. as far as we please, (though *in point of fact* they are not required before the full century 15) ; as in the following Table, to which if thought necessary may be applied corrections for the error 0031 here admitted, as also for the acceleration.

\* It is hardly necessary to remark, that we have no recorded observations so far back as 4000 years, and that many of the earliest recorded are uncertain to half an hour or more. The Table may therefore be depended on farther back than is likely ever to be required.

TABLE II.

Cent.	N. S.	O. S.	B. C. or —
0	17.29	13.29	13.29
1	6.62	4.62	21.96
2	54.96	51.96	30.62
3	44.29	46.29	39.29
4	35.62	37.62	47.96
5	24.96	23.96	56.62
6	14.29	20.29	6.29
7	3.62	11.62	14.96
8	53.96	2.96	23.62
9	43.29	53.29	32.29
10	32.62	44.62	40.96
11	21.96	35.96	49.62
12	13.29	27.29	58.29
13	2.62	18.62	7.96
14	50.96	9.96	16.62
15	40.29	1.29	25.29
16	31.62	51.62	33.96
17	20.96	42.96	42.62
18	10.29	34.29	51.29
19	58.62	25.62	0.96
20	49.96	16.96	9.62
21	39.29	8.29	18.29
22	28.62	58.62	26.96
23	17.96	49.96	35.62
24	9.29	41.29	44.29
25	57.62	32.62	52.96
26	46.96	23.96	2.62
27	36.29	15.29	11.29
28	27.62	6.62	19.96
29	16.96	56.96	28.62
30	6.29	48.29	37.29
31	54.82	39.62	45.96
32	43.96	30.96	54.62
33	35.29	22.29	4.29
34	24.62	13.62	12.96
35	13.96	4.96	21.62
36	5.29	55.29	30.29
37	53.62	46.62	38.96
38	42.96	37.96	47.62
39	32.29	29.29	56.29
40	21.62	20.62	5.96
41	10.96	11.96	14.62
42	0.29	3.29	23.29
43	48.62	53.62	31.96
44	39.96	44.96	40.62
45	29.29	36.29	49.29
46	18.62	27.62	57.96
47	7.96	18.96	7.62
48	58.29	10.29	16.29
49	47.62	1.62	24.96
50	36.96	51.96	33.62

This table requires but little explanation. The first column shews full centuries. That marked N. S. shews the place in half days on the circumference of the card, of the mark for adjusting the N. S. centuries to the mark of ● ● on the outer card. In like manner the columns headed O. S. and B. C. or — shew the places of the marks for adjusting the cards by, in centuries of O. S., or in those before the Christian era.

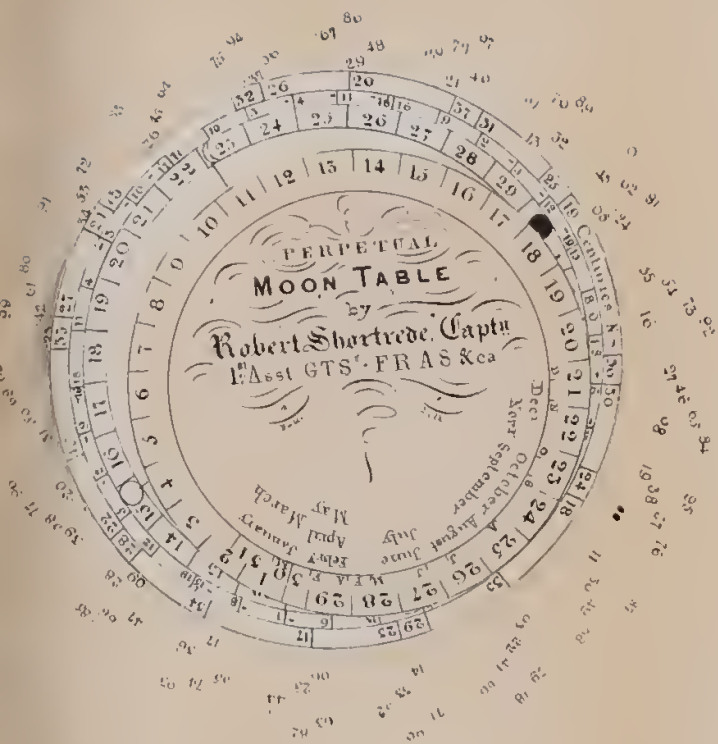
These observations may suffice for shewing the general construction of this card; the reason for giving the century marks their particular position remains to be stated.

According to the Synopsis of Astronomy in Barlow's Tables, (which, and his Dictionary, were the only books of reference within my reach when arranging this Table) the Moon's mean longitude on the 1st of Jan. 1801, was 3s. 21° 36' 42", or 111° 36' 42" that of the sun being 9 10 09.13, or 280 09 13 Hence the moon was then distant } —————

from the sun, } 191 27 29  
or 11° 27' 29" past the full. This at the rate of 29½ days to a lunation, gives the Moon's age on the 1st of January 1801 as 15° 66' 11". Barlow's data being taken from Laplace's Systeme du Monde, are probably adapted to the meridian of Paris. The difference between Paris and Greenwich is 9m. 21.5s. corresponding in lunation days to .00643. Greenwich being to the west of Paris, this must be added to

15° 66' 11", in order to have the Moon's mean age at Greenwich on 1st January 1801. As for the convenience of keeping the same digits throughout a century, I reckon from 1800, the Epact for a year of 365 days must be deducted; this is 10d. 15h. 11m. 24s. which reduced at the rate of 89.50s. daily, becomes 10d. 14h. 55m. 33s. = 10d. 5219, and this taken from 15d. 66 11 + 00643, leaves 5d. 14 56 as the Moon's mean age in lunation days at Greenwich on the 1st January of 1800. In half days this is 10.29, as in the Table.





The outer Card has the odd years of a Century in their order  
The middle Card has on the Outer Circle the odd centuries B.C. and marked  
and on the middle Circle those of the Moon's Age  
The inner Card has Months & days of the Month

The Marks  
Note This Table is adapted to the present time and is  
show the phases of the Moon for any given year of the century  
the green odd years

Set the first Century mark in the middle of the Century  
into line with that of the Moon's Age -  
For dates B.C. add one to the given full Century when  
then as the current year of the Century  
In leap years use the January 1st of the Century  
on the other end being the Month mark  
the day of the Month is the  
to the right  
of the Month  
the right  
of the Month  
the right  
of the Month



It is not distinctly stated by Barlow, whether the era given by him begins at noon or midnight, but as the French Astronomers about that time attempted to introduce civil reckoning, and as the supposition of this appears to agree pretty well with some old Tables, like Ferguson's, which I have lately got hold of, I adopt it, subject to any correction which better authority may hereafter shew to be requisite.

Generally the marks on the card are put on the left of the numbers to which they belong. On the outer card Leap years have two marks, that beside which the number is written answering for the months from March onwards, and the other answering for January and February.

The use of this Table is very much like that of the Table for week days. The full century mark on the middle card is to be set to that of the ● ● on the outer. The given month-mark on the inner card is then to be brought into line with the mark of the current year on the outer: when opposite the days of the month will be seen those of the Moon's age. Opposite ● will be the day of New, and opposite ○ the day of full Moon; and opposite )) and (( the days of the first and last quarters.

The times thus found are of course the mean civil times at Greenwich; but there is no difficulty in reading the Table in astronomical time, as any person will perceive.

In order that the Table may serve for dates before the Christian era, it is to be observed that the year 1 B. C. may be considered as the year ○ of the Christian era, or the hundredth of the century — 1. Hence this rule. Add 1 to the given century B. C. and reckon it —; then to the complement to 100 of the odd year add 1 and reckon that as the current year of the century. In this way the year 721 B. C. is the 80th of the century—8; and may conveniently be written  $\overline{8}$  80, the mark — applying to the full century only, like the negative index of a logarithm.

ROBERT SHORTREDE.

*November, 1841.*

The present Table in conjunction with the one for week days will give Easter for ever with less trouble than by any other method at present known. All that need be done is, to set the Table to March in any given year, and if Full Moon falls after the 21st, find by the

other Table the corresponding week day ; the first Sunday after Easter. If full Moon in March falls before the 21st, set the Table to April, and proceed as before.

Professor Gauss has given a formula for finding Easter without using the Epact, as may be seen in Delambre's *Astronomy*. It is as follows :—

Divide the given number of the year by 19, and let  $a$  be the remainder. The following Table gives  $M$  and  $N$  in the

Divide the given number by 4, and let  $b$  be the remainder. Gregorian Calendar as far as 2,500.

Divide the number by 7, and let  $c$  be the remainder.  $M\ N$

Divide  $(19\ a + M)$  by 30, and let  $d$  be the remainder. From 1582 to 1699 22 3

1700 1799 23 3

1800 1899 23 4

Divide  $(2\ b + 4\ c + 6\ d + N)$  by 7, and let  $e$  be the remainder. 1900 1999 24 5

2000 2099 24 5

Then Easter-day will be the  $(22 + d + e)$  of March or the  $(d + e - 9)$  of April. For 2100 2199 24 6

2200 2299 25 0

the Julian Calendar, this rule is general, where 2300 2399 26 1

2400 2499 25 1

$M = 15$  and  $N = 6$  always, it requires a correction for the Gregorian Calendar. If the calculation gives the 25th or 26th of April, take away seven days.

*On the Treatment of Geometry as a branch of Analysis.* By S. G.

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1. The clothing of purely geometric principles in analytical language—in other words—the conduct of elementary geometric inquiries by functional equations is historically connected with the subject of my former papers. Legendre's endeavour to prove on functional principles, that the three angles of a triangle are equal to two right angles, and thence to deduce the theory of parallels will readily occur to the memory of those familiar with mathematical records. But the first step in developing the idea may be traced higher, and I think successfully, to a yet more illustrious origin.

2. In the 2nd volume of the *Memoirs of Turin*, there is a demonstration, purporting to be by M. Daviet de Foncenex, of the parallelogram of forces. Assuming two forces, each equal to  $a$ , acting at an angle  $\theta$  and denoting their resultant by  $z$ , he states  $z$  to be a determinate function of  $a$  and  $\theta$ , and that this expression must by the principle of homogeneity be of the form

$$z = a f(\theta)$$

It follows from thence, that the angle  $\theta$  remaining constant,  $z$  is always proportional to  $a$ . “On pourrait,” continues the author, “de meme demontrer par cette methode d’une maniere directe et fort naturelle plusieurs theoremes sur la proportionalité des cotés des figures et un grand nombre d’autres propositions de geometrie et de mecanique.”

This essay, I have said, bears the name of Foncenex, but I am induced to attribute it to Lagrange, on the foundation of some curious facts revealed by Delambre in his eulogy on that mathematician, (*Annals of Philosophy*, vol. III). It is there stated that Foncenex received the analytical part of his memoirs from Lagrange, and only performed the task of developing the reasoning on which the formulas depend.\* Parts of this very memoir were afterwards reclaimed and re-written by Lagrange, and the beauty and boldness of the portion we are considering, betray I think undeniable traces of being *ex ungue leonem*, even without the collateral evidence. The conclusion of this historiette is amusing. In recompense for the science displayed in these identical memoirs, Foncenex was appointed Minister of Marine by the Sardinian monarch, an honour which separated him from Lagrange, and he ceased in a short time to take interest in mathematical pursuits. Too simple minded to discern between cause and effect, Montucla laments the unaccountable apathy which Foncenex thenceforward displayed towards researches which had given him profit, and might have added honour. Certain it is, the Minister died and made no sign anent the “plusieurs theóremes de geometrie et de mecanique.”

The essay, which we may therefore attribute to Lagrange, is quoted by Legendre at the foot of his celebrated second note, as doing for me-

\* This, by the way, is the manner in which Göthe is said to have accounted for the fertility and variety of Scott's pen. Sir Walter was supposed to have sketched the plot and skeletoned the chief characters, the whole being then worked up by younger artists at the foot of this Gamaliel! A delicious theory on fertility and variety by one of the most fertile and varied intellects of the age!



chanics what he had done for geometry. And when we take further into account, the long and early intimacy between the two analysts, (Legendre having edited the first edition of the *Mecanique Analytique*), it becomes highly probable that Lagrange was the first who conceived the idea of condensing the scattered truths of geometry into a few families of formulæ, as he did those of mechanics: and that Legendre caught the spirit of such peculiar reasoning from his friend, his own original genius enabling him to apply it with the success he did.

3. Legendre's mode of procedure may be put in the following manner. If from the ends of a given base we draw two straight lines making given angles with that base, we have performed definite operations giving a single fixed result. If this result prove to be a triangle, then the triangle being sole and invariable, its elements must all be determinable by calculations founded on the data which produce that invariability; viz. the base and the base angles. Both the data and the quæsita can only appear in these calculations in the shape of numbers, and therefore either as ratios *inter se*, or ratios involving some constant unit of measurement. Now the angles have such a constant unit in the right angle, but the sides have not, there being no natural unit of linearity. The consequence will be, that the sides can only appear in the calculations as ratios *inter se*, but the angles may appear either as ratios *inter se*, or as fractions of a right angle. Now among the elements of the triangle which are determined by the base and base angles is the third angle, it will follow therefore that there is some form of calculation connecting this third with the data. But of these four the angles easily enter the calculation, while we do not see how the side can, since there is no other line necessarily involved in the matter. We conclude therefore that the side cannot enter, and therefore that the third angle is determinable only by help of the other two. Hence, whenever two angles in each of two triangles are identical, each to each, the third angles are also identical.

The sequel of this demonstration is geometrical. By dropping a perpendicular on the hypotenuse from the right angle, we divide a right angled triangle into two others, each of which has two angles equal to two of the primitive triangle. They are consequently equiangular to the primitive triangle and to each other, whence it is seen, that the two acute angles of the large triangle are together equal to the right angle,

and hence all three to two right angles. The proof is then extended to triangles in general, by dividing them into right angled triangles.

4. The publication of this train of reasoning excited a discussion unprecedented in the cold calm regions of science, and one which assumed a character of acrimony, that can only be accounted for by the political antipathies which extended even to the schools of mathematics. Ivory, Leslie, Playfair, Brewster, Maurice, Nieuport, and the great author himself, took prominent parts in the controversy. It is not my intention to raise, or lay the ghosts of departed objections. Stated in the manner I have done, divested of the appalling formalities of a functional investigation, there are only two points in Legendre's proof over which the reader will pause for an instant.

The first is, why will geometric determination afford any grounds for numerical calculation? This is easily answered. The remaining elements being geometrically given, their proportions to the data are given, that is, a series of numbers being assumed for these last, a series of numbers for the rest are found. Hence the necessity of supposing a numerical process connecting the consequent numbers with the assumed ones.

The second is of a graver character. It is suggested at the place where, having settled that the calculation of the third angle involves only the magnitudes of the other two, we conclude that two triangles, having two angles equal each to each, will also have the third angles equal. This conclusion is evidently founded on the assumption that there is an invariable formula of calculation for *all* triangles, connecting the third angle with the other two. The question is, having assured ourselves that the triangle ABC has a formula connecting the angle C with A and B, what grounds have we to suppose that the *same* formula will be applicable to A'B'C'? The fairest mode of meeting the query I conceive to be this. When a base is laid down and lines are drawn making given angles with it, we perceive intuitively that the system is fixed. The magnitude of the base and base angles is not a constituent of this fixity. They may vary, but the conception of *determination* remains not the less distinct. To express this *fact* analytically, we must say that the magnitudes in the triangular system vary *inter se*, but the laws which connect their respective variations are invariable and universal. Hence we conclude that every geometrical

figure has its peculiar but invariable formula of calculation. The geometrical definition prescribes an invariability of form as regards *figure*: when we transfer the question into the domains of analysis, we introduce a consideration equivalent to this, it is the invariability of form as regards *calculation*.

Legendre's own attempt to clear up this point is not even specious, although while his impregnable positions were hotly attacked, the weakest escaped all but the practised eye of Sir James Ivory. He had to prove that the formula by which the third angle is calculated from the base and base-angles applies to all triangles. He imagines two triangles, one constructed with the data  $a, B, C$ , and another with  $a', B, C$ , having, if possible different formula, the first say  $\phi$ , the second  $\phi'$ . Then considering  $a'$  to vary to  $a$ , he obtains a third triangle. But this third triangle has the same data as the first, and its third angle is therefore equal to that of the first. Hence it must be calculated by the same formula. *But the formula of the third is that of the second*, that is  $\phi'$ , hence  $\phi$  &  $\phi'$  are the same formula. The words in italics beg the question glaringly: if the variation of an element can make a formula vary (which is to be disproved,) then the change of  $a'$  into  $a$  gives the third triangle some new formula more or less different from  $\phi'$ : the principle of superposition shews that it is identical with  $\phi$ , hence  $\phi$  differs from  $\phi'$ , and there is no absurdity forced upon the adversary.

5. The geometrical weight of this flaw is of importance and great interest. It was pointed out by Sir J. Ivory, that to assume  $a'$  to change to  $a$  while the base angles remain  $B$  and  $C$  as before, is equivalent to drawing from the ends of a base  $a$ , lines making with it angles equal to those of a given triangle  $A' B C$ . To assume further that the formula of  $A' B C$  will apply to the new figure is to assume, that the new lines will form a triangle with the new base  $a$ . The double assumption amounts therefore to stating, that two lines making given angles with a third will always meet, the only thing known regarding those given angles being that they are less than two right angles; since they are angles of a given triangle. This is nothing more nor less than Euclid's axiom, and therefore Legendre's process involves the assumption of that axiom. The analytical investigation therefore rests on an assumption, that of the *invariability of formula* as distinguishing a defined geometrical figure, which no skill can do away

with, and which must either be the subject of postulate, axiom or demonstration.

6. To his striking presentation of the 32d Prop. Legendre added the "plusieurs theoremes sur la proportionalité des cotés des figures," yet notwithstanding the intense interest excited by the publication, the violent discussions to which it gave rise, and the eminent individuals who enlisted themselves on one or other side, it has often appeared to me singular, that no attempt should have been made to develop the whole system of elementary geometry in a concinnous form on the same principles.\* Independent of its utility as an introduction to the methods of analysis, the young mathematician would be benefited by seeing grouped together those truths which are nearest related in affinity: he would, in the language of Decandolle, have those nearest in books which are nearest in the order of nature.

7. The only principle on which it would be necessary to base such an attempt would be this: that every defined geometrical figure is the representation of certain invariable formulæ of calculation, the numbers involved in such calculations being represented by the ratios of sides, angles, areas, and the other concomitants of the figure, either *inter se*, or to any homogeneous natural constants that may exist.

8. A triangle then considered analytically will represent a set of formulæ expressing the relation between its sides and angles. If according to the usual notation these be  $a, b, c, A, B, C$ , we have

$$F \{ a, b, c, A, B, C, K \} = 0$$

The letter  $K$ , introduced into the formula, stands for the constants which may be furnished by nature. There are, however, no linear constants, but there is an angular one—the right angle; it follows therefore that  $K$  can only be a function of the right angle. When therefore the formula assumes a numerical shape, it must be written

$$F \left\{ \frac{a}{b}, \frac{a}{c}, \frac{A}{K}, \frac{B}{K}, \frac{C}{K} \right\} = 0$$

These are all the ratios necessary to be taken into account as

$$\frac{b}{c} \text{ is } \frac{a}{c} \div \frac{a}{b} \text{ and } \frac{A}{B} = \frac{A}{K} \div \frac{B}{K}; \text{ \&c.}$$

\* While this has been passing through the press, I have met with in Lacroix an allusion to "M. Corancez qui dans un Memoire fondé sur des principes analogues est parvenu aux theoremes les plus importants de la Geometrie Elementaire."



9. The next step is to inquire whether the expression does not admit of modification, or whether it is essential to the determination of the triangle that five at least of its elements should be given. A short process of deduction informs us, that from the data  $a, B, C$ , not more than a single triangle can be constructed, and that therefore those three elements are sufficient for the *complete* determination of all the rest. But it will be quite unwarrantable to say, that even these three are absolutely necessary (every one of them) to calculate any given one of the elements. In calculating  $A$  it is at once evident, that two will be quite enough. For the  $b$  and  $c$  being settled to be foreign to the computation the ratios  $\frac{a}{b}$  and  $\frac{a}{c}$  cannot enter, and therefore  $a$  itself is foreign.

Hence the computation of  $C$  depends exclusively on  $A$  and  $B$ ; or

$$C = F \{A, B, K\}$$

Recurring now to the artifice of Legendre or Leslie, it is easy to prove  $A + B + C = \pi$ . This truth embodies Euclid I. 32, 16, 17.

If there be another triangle  $A'BC$  on the same base  $BC$  and enveloping  $ABC$ ; the angles  $A'BC + A'CB > B + C$ , hence  $A' < A$  (Euclid I. 21). If  $A$  then move away from  $BC$ , the angle  $A$  diminishes and  $B + C$  increases. When  $A = 0$ , the lines  $b$  and  $c$  do not meet, that is, they become parallel; at this moment then  $B + C = \pi$ . Hence parallels cut by a third straight line have the interior angles equal to two right angles. The converse is also true since if  $B + C = \pi$  the angle  $A$  made by  $b$  and  $c$  must be zero, whence those lines are parallels. (Euclid I. 27, 28, 29, 30.)

10. I now proceed to determine the form of the functional equation representing a triangle. Take a triangle right angled at  $C$ , then since it is determinable by the data  $A, B, c$ , we can calculate  $a$  and  $b$  by the help of  $c, A, B$ . But  $C$  being right,  $A$  is calculable from  $B$  directly, therefore each side is calculable by the hypotenuse and one of the angles. The formula will therefore contain the ratio of the two lines and the ratio of the angle. Write it thus:—

$$\frac{a}{c} = \phi(A) \quad \text{and} \quad \frac{b}{c} = \psi(A)$$

But the relation of  $a$  to its opposite angle  $A$  is *symmetrical* with that of  $b$  to  $B$ ,  $\therefore$

$$\frac{a}{c} = \psi(B) \quad \text{and} \quad \frac{b}{c} = \phi(B)$$



Calling the functions  $\phi$  and  $\psi$  by the names *sin* and *cos*, we have

$$a = c \cos B = c \sin A, \text{ and } b = c \cos A = c \sin B.$$

These considerations premised, it is easy to determine the general form of the functional equation for any triangle ABC. Drop a perpendicular from A on  $a$ , then  $a$  will be divided into two parts, the one adjacent to the angle B must as above be equal to  $c \cos B$ , and the other, adjacent to the angle C must also be  $b \cos C$ . Hence

$$a = b \cos C + c \cos B.$$

Besides, the perpendicular in the one triangle equals  $b \sin C$ , in the other it is  $c \sin B$ ; these are therefore equal or

$$b \sin C - c \sin B = 0$$

The conditions of symmetry give us two other pairs of equations.

$$\left. \begin{aligned} a &= b \cos C + c \cos B \\ b &= a \cos C + c \cos A \\ c &= a \cos B + b \cos A \end{aligned} \right\} \dots (\alpha) \quad \left. \begin{aligned} b \sin C - c \sin B &= 0 \\ a \sin C - c \sin A &= 0 \\ a \sin B - b \sin A &= 0 \end{aligned} \right\} \dots (\beta)$$

11. We must remember, however, that the functions *sin* and *cos* are only intelligible with regard to acute angles, since from the consideration of such only they were derived in (10). The formulæ above apply therefore only to acute angled triangles, unless we are able to put such an interpretation on *sin* and *cos* in the case of right and obtuse angles, as will permit us to consider ( $\alpha$ ) and ( $\beta$ ) universal forms.

If ( $\alpha$ ) and ( $\beta$ ) are to apply to all triangles, then if C were a right angle we should have

$$b = a \cos \left( \frac{\pi}{2} \right) + c \cos A \text{ and } a \sin \left( \frac{\pi}{2} \right) - c \sin A = 0$$

But examining a triangle right angled at C, we perceive as in (10),

$$b = c \cos A \text{ and } a - c \sin A = 0.$$

Hence to admit the generality of ( $\alpha$ ) and ( $\beta$ ) we must interpret

$$\cos \left( \frac{\pi}{2} \right) \text{ as } 0 \text{ and } \sin \left( \frac{\pi}{2} \right) \text{ as } 1.$$

If the triangle again were obtuse at C, the perpendicular from A would fall on  $a$  produced, hence  $a$  would be the difference of  $c \cos B$  and  $b \cos (\pi - C)$  or  $a = c \cos B - b \cos (\pi - C)$ . The perpendicular is also in one case  $c \sin B$ , in another  $b \sin (\pi - C)$ ; or

$$c \sin B - b \sin (\pi - C) = 0$$

Compare these with ( $\alpha$ ) and ( $\beta$ ) supposed to be universal, and it must follow that

$$\cos C = -\cos (\pi - C) \text{ and } \sin C = \sin (\pi - C)$$

are the only interpretations that can be put on the *sin* and *cos* of the

obtuse angle C. We are now in a position to consider ( $\alpha$ ) and ( $\beta$ ) universal.

A little further study of the angular functions will contribute to subsequent condensation. In the triangle right angled at C, we have  $a = c \sin A$  and  $b = c \cos A$ , dividing one by the other

$$\frac{a}{b} = \frac{\sin A}{\cos A} = \text{a function of } A; \text{ specify it as } \tan A$$

$\therefore a = b \tan A$ . Now  $b$  remaining the same, by inspection  $a$  will increase as  $A$  increases, therefore  $\tan A$  increases with  $A$ . This will make  $\sin A$  increase with  $A$ . For  $\cos A$  (being  $\sin B$ ) is related to  $B$  as  $\sin A$  to  $A$ . When  $A$  increases,  $B$  diminishes; if then  $\sin A$  did not increase,  $\cos A$  would not decrease, and  $\tan A$  their quotient would not increase. This as relates to acute angles; with regard to obtuse ones  $\pi - A$  decreases as  $A$  increases, hence the  $\sin$  will decrease positively, and the  $\cos$  increase negatively, the  $\tan$  of course increasing negatively.

*Table of change with angle increasing.*

Angle.	Sin.	Cos.	Tan.
acute	+ increase.	+ decrease.	+ increase.
right	1	0	+ $\infty$
obtuse	+ decrease.	— increase.	— decrease.

It will follow therefore as the  $\sin$  is a function increasing continuously from 0 to 1, and then decreasing continuously from 1 to 0, as the angle increases continuously from 0 to  $\pi$ , that any given value of  $\sin$  will be found in two parts of this course on either side of the maximum 1 and thus belongs to two angles  $A$  and  $\pi - A$ ; whence there is an ambiguity in determining the angle from the  $\sin$ , unless there is something to tell us whether it is obtuse or acute. Also if  $\sin B$  be less than  $\sin A$ ,  $B$  may be an angle less than the angle  $A$ ; but if  $A$  be an acute angle,  $B$  may also be an angle greater than the obtuse  $\pi - A$ . The latter case, however, can never occur when  $B$  and  $A$  belong to the same triangle, since  $B + A$  are always  $< \pi$  and  $\therefore B < \pi - A$ . In a triangle therefore if  $\sin A > \sin B$ ;  $A > B$ , and vice versa.

With the  $\cos$  there is no ambiguity, the sign + or — immediately determines whether the angle is acute or obtuse. If we have

$$\cos A = \cos B, A = B; \text{ if } \cos A > \cos B, A < B.$$

12. We are now in a condition to discuss the geometrical properties *implicated* in equations (a) and ( $\beta$ ). The first set can be presented in a more convenient form by eliminating  $\cos B$  and  $\cos C$  from the first by the help of the second and third.

It then becomes

$$\left. \begin{array}{l} a^2 = b^2 + c^2 - 2bc \cos A \\ \text{symmetrically } b^2 = a^2 + c^2 - 2ac \cos B \\ \text{and } c^2 = a^2 + b^2 - 2ab \cos C \end{array} \right\} \dots (\gamma)$$

On these two sets of equations,  $\beta$  dependent on the sin and  $\gamma$  on the cosinal forms of the functions, the entire geometry of triangles can be raised with little more difficulty than is experienced in the deduction of a corollary.

Taking the first equation of  $\beta$ , it can be changed to the proportion  $b : c = \sin B : \sin C$ .\* Hence if  $b = c$ ;  $\sin B = \sin C$ . It will follow that  $B = C$  (I. 5) for the ambiguity  $B = \pi - C$  cannot take place, since two angles of a triangle cannot both be obtuse. Similarly, if  $B = C$ ;  $b = c$  (I. 6). If  $b > c$ ,  $\sin B > \sin C$ , and therefore  $B$  must be greater than  $C$  (I. 18). The converse evidently follows (I. 19).

Again, by composition the proportion becomes

$$b + c : c = \sin B + \sin C : \sin C.$$

and compounding this with a proportion derived from the 2d of  $\beta$ ,

$$b + c : a = \sin B + \sin C : \sin A.$$

Suppose another triangle  $A'B'C'$  on the same base  $a$  inclosed within  $ABC$ , so that  $B > B'$  and  $C > C'$  then also  $A' > A$ . This triangle will also have

$$b' + c' : a = \sin B' + \sin C' : \sin A'.$$

Compounding  $b + c : b' + c' = (\sin B + \sin C) \sin A' : (\sin B' + \sin C') \sin A$ .

But the second antecedent is entirely greater than its consequent ;

$$\therefore b + c > b' + c' \dots \dots \dots (\text{I. 21})$$

If  $A'$  fall on the base,  $b' + c'$  will equal  $a$

$$\therefore b + c > a \dots \dots \dots (\text{I. 20})$$

13. Consulting the first of  $\gamma$ . As  $A$  increases while acute,  $\cos A$  decreases, hence a less amount is taken from  $b^2 + c^2$  and  $a$  consequently increases. When  $A$  becomes obtuse,  $\cos A$  is negative, and the third term therefore additive ; now also then increase of  $A$  adds more to  $b^2 + c^2$  and therefore to  $a^2$ . Always therefore if  $b$  and  $c$  remain

\* This notation is German, and very expressive, proportion being the *equality* of ratios.

constant, the increase of  $A$  increases  $a$ , and vice versâ, the increase of  $a$  will increase  $A$ , (I. 24, 25).

14. We proceed now to the general determination of triangles. We might first fix the conditions necessary to determine them in individuality, and then in species as Euclid has done; but it will be more consonant to the spirit of analysis to obtain the most general first. Dividing the equations  $(\gamma)$  by  $c^2$  and  $(\beta)$  by  $c$  and writing  $\frac{a}{c}$  as  $m$  and  $\frac{b}{c}$  as  $n$ , we have

$$\left. \begin{aligned} m^2 &= n^2 + 1 - 2n \cos A \\ n^2 &= m^2 + 1 - 2m \cos B \\ 1 &= m^2 + n^2 - 2mn \cos C \end{aligned} \right\} \text{ and } \left. \begin{aligned} n \sin C - \sin B &= 0 \\ m \sin C - \sin A &= 0 \\ m \sin B - n \sin A &= 0 \end{aligned} \right\}$$

From these six equations, each involving three quantities, any two being given, the rest will be determined. The cases will be

First:  $m$  and  $n$  given or the ratios of the sides. Here the angles are determined by their cosines, and hence no ambiguity can occur. The form of the triangle is known, or its species determined (VI. 5).

Second:  $m$  and  $B$  given or the ratios of two sides  $(a, c)$  and the included angle. Still  $n$  being determined by the 2nd of the first set, the rest are determined as in the former case, and no ambiguity is involved. (VI. 6.)

Third:  $A, B$  and therefore  $C$ , given; or the three angles. Here  $m$  and  $n$  are determined by the first two of the 2nd set, and there is no ambiguity. (VI. 4.)

Fourth:  $m$  and  $A$  given or the ratio of two sides  $(a, c)$  and, an angle opposite to one. In this case  $C$  is determined by the 2nd of the 2nd set: the sinal function entering occasions ambiguity. If  $m$  be  $> 1$ ,  $a$  is greater than  $c$  and therefore  $A$  than  $C$ , whence  $C$  cannot be obtuse and there is no ambiguity; but if  $m < 1$  or  $a$  is less than  $c$ , there is no way of avoiding the difficulty, unless the species of  $C$  be directly given. (VI. 7.)

If now the length of one of the sides be given in addition to the ratio in which it is involved, the triangle will be determined individually as well as in species. This can occur in 1st, 2nd and 4th cases, which produce (Euclid I. 8, 4 and 26) and (Young I. 26). There being no ratio given in the third case, there is no individual triangle determined by the three angles.

15. With regard to the linear properties of parallels. If a straight line cut the sides of a triangle or these produced, parallel to the base, a triangle is formed of the same species, and hence the sides are divided proportionally. The converse is similarly true (VI. 2). The base of the new triangle will also bear the same proportion to that of the primitive.

If now the base angles of the primitive triangle increase, so that the sides approach parallelism, the sides of the two triangles increase without limit, approaching equality as they do so, without limit. Hence when the sides do become parallel, the ratio is one of equality, and the frustrum of the triangle having become a parallelogram, it follows that the opposite sides of a parallelogram are equal (I. 34). If the parallelogram be rectangular, each pair of sides will be the *distances* between the other pair, hence parallels are equidistant.

The two very elegant propositions (VI. 3, A,) are fragments of an entire series relating to the segments of sides by lines drawn from the opposite angles. It is not the intention of this paper to touch on supplemental trains of inquiry, but only to sketch those on which the rest may be scaffolded with ease. The propositions in question may, however, be simply proved thus: If a line be drawn from A to *a* and making with *c* an angle called  $\theta$ , the segment on *a* between this line and B is  $\frac{c \sin \theta}{\sin (B + \theta)}$  & that between the line & C is  $\frac{b \sin (A \sim \theta)}{\sin (B + \theta)}$

Their ratio is consequently always  $c \sin \theta : b \sin (A \sim \theta)$ , and will be reduced to that of  $c : b$ , when  $\sin \theta = \sin (A \sim \theta)$ . If the cutting line fall within the triangle, this gives  $\theta = A - \theta$  or  $\theta = \frac{1}{2} A$ ; (VI. 3). If without,  $\theta = \pi - (\theta - A)$  or  $\theta = \frac{1}{2} (\pi + A)$ ; (VI. A).

16. The area of any plane figure is a function of its sides and angles. But the sides can be projected on two rectangular axes by help of what precedes, hence the area is also determinable by means of these projections and the angles. The simplest area to consider is that of the rectangle, because if the origin be at one of its angles and the including sides be the axes, they are also the projections of the others. The angles are besides equal, and natural constants. Let the ratio of the sides to the linear unit be *a* and *b*, and that of the area to the superficial unit be A, then  $A = \phi (a, b)$ . Inspection and our previous



knowledge inform us at once, that if  $a$  be increased  $p$  times and  $b$ ,  $q$  times, the area is increased  $pq$  times, hence  $pqA = \phi(pa, qb)$ .

$$\therefore A = \frac{\phi(pa, qb)}{pq} = \phi(a, b).$$

Hence  $\phi(pa, qb)$  must be divisible by  $pq$  with a quotient independent of  $pq$ . Symmetrically therefore it must also be divisible by  $ab$  with a quotient independent of  $a$  and  $b$ ; let the quotient of both divisions be  $k$ . Then

$$\phi(pa, qb) = kabpq.$$

$$\therefore pqA = kabpq \text{ or } A = kab.$$

Assuming now as is usual, that the superficial unit is the square on the linear unit, we find  $k$  by making  $a = b = 1$  (the linear unit)  $\therefore A = 1$  (the superficial unit). Hence  $k = 1$  and therefore

$$A = ab.$$

17. From this well known theorem, the various properties of rectangular areas flow with the utmost facility. The first ten of Euclid's second book are reduced to the results of algebraic multiplication and division, remembering that area of square on  $a$  equals  $a \times a = a^2$ .

Recurring to equations  $\gamma$  in (12), if a perpendicular be dropped on  $a$  from  $A$ , the segment between it and  $B$  is  $c \cos B$ ; call it  $s$ ,

$$\therefore b^2 = a^2 + c^2 \pm 2as$$

the double sign depending on the species of  $B$ . If it be obtuse  $2as$  is additive (II. 12); if acute,  $2as$  is subtractive (II. 13); if it be right  $s = 0$  or  $b^2 = a^2 + c^2$ , (I. 47). Similarly if  $b^2 = a^2 + c^2$ ,

$$\cos B = 0 \text{ and } \therefore B = \frac{1}{2} \pi \text{ (I. 48.)}$$

18. A triangle is easily shewn to be half a rectangle on the same base, and with the same altitude, hence a triangle  $= \frac{1}{2}$  altitude  $\times$  base. The following consequences immediately result. Triangles or parallelograms on equal bases vary as their altitudes and vice versa (Young VI. 12). Triangles and parallelograms having equal bases and equal altitudes are equal, and the contrary (I. 35, 36, 37, 38, 39, 40). If  $a$  be the base of a triangle  $\Delta$ , the altitude or perp. from  $A = c \sin B$

$$\therefore \Delta = \frac{1}{2} ac \sin B.$$

$$\therefore \Delta : \Delta' = ac \sin B : a'c' \sin B'$$

If then the triangles  $(\Delta, \Delta')$  are equal and an angle in each  $(B, B')$  equal,  $ac = a'c'$  or the sides are reciprocally proportional (VI. 15).

If  $ac = a'c'$  and  $B = B'$ ;  $\Delta = \Delta'$  (VI. 15). If again equal triangles have each a pair of sides reciprocally proportional, or  $\Delta = \Delta'$  and  $ac = a'c'$ ; then  $\sin B = \sin B'$ , or the angles contained by those sides are equal or *supplementary*. Also if  $B$  only  $= B'$ ;  $\Delta : \Delta' = ac : a'c'$ . This extended to parallelograms is (VI. 23), as (III. 15) may be extended into (VI. 14).

Again, since two rectangles are as their products  $ab : a'b'$ , the truth of (VI. 16 and 17) is evident.

19. Considering the area  $P$  of a polygon in the light of a function of sides and angles, we have

$$P = \phi \left\{ a, b, c \dots\dots\dots A, B, C \dots\dots\dots \right\} \text{ or in a numerical form}$$

$$\frac{P}{a^2} = \phi \left\{ \frac{b}{a}, \frac{c}{a}, \dots\dots A, B, C \dots\dots \right\}, a \text{ being taken as linear and } a^2$$

as superficial unit. Hence in all similar polygons  $P : P' = a^2 : a'^2$ . (VI. 19, 20.) If further  $P'' : P''' = a''^2 : a'''^2$  and it be given  $a : a' = a'' : a'''$  then *ex æquali*

$$P : P' = P'' : P''' \quad (\text{VI. 22.})$$

Likewise if  $P : P' : P'' = a^2 : a'^2 : a''^2$  and  $a^2 = a'^2 + a''^2$ ; then

$$P = P' + P'' \dots (\text{VI. 31.})$$

20. As we have treated areas, we might treat volumes. The right solid being of three dimensions  $V = \phi(a, b, c)$ . Increasing  $a$   $p$ -fold,  $b$   $q$ -fold and  $c$   $r$ -fold  $V$  is increased  $pqr$ -fold and  $\phi(a, b, c)$  is shewn to be  $kabc$ . The solid unit then assumed is the cube on the linear unit, and  $V = abc = \text{altitude} \times \text{base}$ . Hence the right prism is also *altitude*  $\times$  *triangular base*. The oblique paralleliped is also *altitude*  $\times$  *base*. By these principles we see at once the truth of (XI. 25, 28, 29, 30, 31, 32, 33, D, 34, 40.)

21. The examination of the circle is divided into the consideration of angles, of chords, secants, and tangents (which have one general analytical character,) and of areas as connected with the circle.

Laying down the angle at the centre double of that at the circumference on the same arc, as in Euclid, it will apply even if the former be  $\pi$  or a reverse angle, (III. 20). One consequence is—all angles at the circumference on the same arc are equal, (III. 21). Another, that they will be  $\frac{1}{2}(\pi - x)$ ,  $\frac{1}{2}\pi$ , or  $\frac{1}{2}(\pi + x)$  as the angle at the centre is less, =, or greater than  $\pi$ ; (III. 31). Lastly, if an angle at centre

$= x$ , the reverse is  $2\pi - x$ ; hence their halves or the angles at the circumference on opposite sides of the same chord are  $\frac{1}{2}x$  and  $\pi - \frac{1}{2}x$ , their sum is therefore  $\pi$  (III. 22.)

If the angle  $\theta$  at the circumference stand on the chord  $c$ , the radius being  $r$ , the angle at the centre is  $2\theta$  and (by  $\gamma$  in art. 12) it is seen  $c = 2r \sin \theta$ . I assume the formulæ of trigonometry here, as they are all deducible independently by help of  $\gamma$ . Hence if  $c$  and  $r$  be constant,  $\theta$  is constant; or if  $r$  and  $\theta$  be constant,  $c$  is constant, (III. 26, 27, 28, 29). Also  $c$  is a maximum with  $\sin \theta$ , i. e. when  $\theta = \frac{1}{2}\pi$  (III. 15).

22. Now as to lines intersecting a circle. Let P be a point whose distance from the centre is  $d$ , and  $\rho$  a secant through it inclined to  $d$  at an angle  $\theta$ . Then  $\rho$ ,  $d$  and  $r$  (the radius) form a triangle, the two former including  $\theta$ ; hence

$$r^2 = \rho^2 + d^2 - 2\rho d \cos \theta$$

$$\text{or } \rho^2 - 2\rho d \cos \theta = r^2 - d^2.$$

The quadratic form shews that there are two roots only. Hence the line cuts the circle in two points at most. The solution of the quadratic is

$$\rho = d \cos \theta \pm \sqrt{r^2 - d^2 (\sin \theta)^2}$$

If the point be within the circle,  $r > d$ ; and the roots are both always possible since  $\sin \theta < 1$ . If  $\theta = \frac{1}{2}\pi$ , the two values of  $\rho$  become equal; which with its converse is (III. 3). The increase of  $\theta$ , diminishing  $d \cos \theta$  and increasing  $d \sin \theta$ , will diminish  $\rho$ ; the maximum of  $\rho$  being when  $\theta = 0$  and the minimum when  $\theta = \pi$  (III. 7). If  $\theta$  be measured negatively and the secant called R, we shall have,

$$R = d \cos (-\theta) \pm \sqrt{r^2 - d^2 (\sin -\theta)^2}$$

$$= d \cos \theta \pm \sqrt{r^2 - d^2 (\sin \theta)^2}$$

which shews an equal secant on the opposite side of the diameter, (III. 7).

The same is true if the point be beyond the circle, but as  $d$  is then  $> r$ , the line  $\rho$  will only cut the circle while  $d \sin \theta$  is less than  $r$ , (III. 8). When  $d \sin \theta = r$ ,  $\rho = d \cos \theta$ ; since there is only one value the line  $\rho$  is a tangent and for that value  $r^2 + (\tan \theta)^2 = d^2$  or the tangent is perpendicular to the radius through the point of contact, (III. 17, 18, 19).

23. By the theory of equations, if  $s$  and  $s'$  be the segments of  $\rho$  between the point P and the circumference,  $ss' = d^2 - r^2$ . Hence

when  $d$  is constant, or for secants through the same point, the rectangle of the segments is a constant quantity, (III. 35, 36). If the point be without the circle,  $d$  is greater than  $r$  and  $d^2 - r^2$  is  $\tan^2$ , therefore  $ss' = \tan^2$  (36, 37.)

24. If two radii be drawn including a given angle  $\theta$  at the centre, they determine a certain arc of the circle in length, as well as the sector corresponding to that arc. Denote the former by  $l$ , the latter by  $S$ ; then ( $\theta$  standing for the ratio of the angle  $\theta$  to the right angle)

$$\frac{l}{r} = \phi(\theta) \text{ and } \frac{S}{r^2} = \psi(\theta)$$

Take  $p$  arcs equal to  $l$ , we have  $p$  angles equal to  $\theta$  and  $p$  sectors equal to  $S$ ;

$$\therefore \phi(p\theta) = \frac{pl}{r} = p \cdot \phi(\theta) \text{ and } \psi(p\theta) = \frac{pS}{r^2} = p \cdot \psi(\theta)$$

The solutions of these equations are  $\phi(\theta) = m\theta$  and  $\psi(\theta) = n\theta$ :  $m$  and  $n$  being certain constants,

$$\therefore l = mr\theta \text{ and } S = nr^2\theta$$

Hence if  $r$  remains the same,  $l$  and  $S$  are proportional to  $\theta$ , (VI. 33).

25. We cannot determine  $m$  and  $n$  without the aid of limits, because they involve the comparison of curvilinear length with rectilinear length. If we bisect the arc continually and join the points of bisection, we shall have a series of polygons of chords whose perimeters approximate to the arc without limit, while the areas between them and the radii approximate at the same rate to the sector. Denoting the ratio of the chord of  $\theta$  to radius by  $c$ ; that of the chord of  $\frac{1}{2}\theta$  by  $c[\frac{1}{2}]$ ; that of chord of  $\frac{1}{4}\theta$  by  $c[\frac{1}{2}]^2$ , and so on we have for the perimeters of the successive polygons,

$$cr; 2c[\frac{1}{2}].r; 2^2c[\frac{1}{2}]^2.r \dots\dots\dots 2^n c[\frac{1}{2}]^n.r$$

And their areas successively

$$\frac{r}{2}.cr; \frac{r}{2}.2c[\frac{1}{2}].r \dots\dots\dots \frac{r}{2}.2^n c[\frac{1}{2}]^n.r$$

At the limit, therefore, the sector =  $\frac{r}{2} \times$  arc, and consequently the area of the circle =  $\frac{r}{2} \times$  circumference.

Also we calculate the chord of half an arc from that of the whole by

$$c[\frac{1}{2}] = \sqrt{\left\{2 - \sqrt{4 - c^2}\right\}}$$

Commence with the angle  $60^\circ$  or  $\theta = \frac{2}{3}$  when  $c = 1$ , and calculate successively  $c[\frac{1}{2}]$ ,  $c[\frac{1}{4}]$ ,  $^2$  &c.; and we shall find the series of perimeters given above approach the limit  $1.0471975511 \dots \times r$ , which is consequently the length of the arc of  $60^\circ$ ; call it  $\frac{\pi}{3} r$ , then  $\pi = 3.14159\dots$  and the circumference of the circle is  $2\pi r$ , and its area is  $\pi r^2$ ; proving circles to be as the squares of their radii, (XII.<sup>2</sup>).

Now recurring to the general formula for arc and sector; if  $\theta = 4$ , the arc becomes  $2\pi r$  and the sector  $\pi r^2$ ; hence  $m = \frac{\pi}{2}$  and  $n = \frac{\pi}{4}$ ; consequently  $l = \frac{\pi r \theta}{2}$  and  $S = \frac{\pi r^2 \theta}{4}$

26. In conclusion, by freely applying the principle of limits, the pyramid is treated as the limiting value of a series of inscribed prisms,

$$\frac{Bh}{n^3} \cdot n^2, \quad \frac{Bh}{n^3} \cdot (n-1)^2, \quad \frac{Bh}{n^3} (n-2)^2, \dots \frac{Bh}{n^3} \cdot 2^2, \quad \frac{Bh}{n^3} \cdot 1^2$$

where  $B$  is the base of the pyramid, and  $h$  its altitude, and  $n$  the number of inscribed prisms; the sum of the series is

$$\frac{Bh}{n^3} \cdot \frac{(n+1)n(2n-1)}{2 \cdot 3} = \frac{Bh}{6} \left(1 + \frac{1}{n}\right) \left(2 - \frac{1}{n}\right)$$

At the limit  $n$  is infinite, and the series completes the pyramid. Therefore

$$\text{Pyramid} = \frac{1}{3} \text{ base} \times \text{altitude.}$$

This involves (XII. 3, 4, 5, 6, 7, 8, 9). The case of similar pyramids, (XII. 8,) is done by transformations into similar parallelopipeds.

Cylinders are the limits of polygonal prisms inscribed in them; and cones, those of the inscribed pyramids. Their properties are therefore the same as those of prisms and pyramids, their circular bases permitting a definite reference to the homologous lines, the radii. (XII. 10, 11, 12, 13, 14, 15.)

Lastly, the sphere is determined solely by its radius. Hence the volume of the sphere bears a determinate ratio to the cube of its radius.

27. Modern authors of the highest repute have concurred in deducing the theory of Trigonometry from the definitions of  $\sin$  and  $\cos$ , which I have adopted at the commencement of this paper, introducing the functions  $\tan$ ,  $\sec$ , &c. as convenient abbreviations, but without any reference to their geometric meaning. (See Peacock's Report on Analysis. Brit. Assoc. 1833, page 291.)



The application of a few abstract principles to geometrical ideas of the simplest character enables us thus to develop the whole mass of complicated properties founded on them, in a comprehensive and cinnous mode; justifying by the result the daring paradox of D'Alembert, that the more abstractedly an investigation is carried on, the more lucid and satisfactory does it become. It must not, however, be for a moment forgotten that analysis is but the lever; the fulcrum of its support lies in the ideas peculiar to the subject to which it is applied. Without a vivid and distinct conception of them our labour is idle. Professor Whewell in his tractates has done mathematical education signal service by insisting on this point, and his own works on Mechanics, with those of Professor De Morgan on Algebra and the Differential Calculus, may be hailed as some of the most valuable gifts which the thoughtful student has received from the hands of the masters of science.

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*Description of a new genus of Falconidæ. By B. H. HODGSON, ESQ.*

In the Journal of the Society for April, 1836, p. 227, I described a species of Eagle as *Aquila pernigra*, but without noticing its singular peculiarities of form, as especially the unique foot, of which the outermost fore digit is even smaller, in proportion to the innermost, than in the human hand. There is no such foot heretofore described in the whole family. The rest of its structure, as the feeble legs and vast floating wings, agrees with *Milvus*; and, in sooth, our genus *Heteropus* should stand *inter Aquilinarum et Milvinarum stirpes*, and be thus characterized:—Bill and head small and undepressed, *aquilomilvine*. Figure slender, with very ample wings and tail, the former rather exceeding the latter; their gradation aquiline, having the greatest quills incurved. Tarsi short and plumed. Toes nervous, unequal, the inner and hind highly developed, the inner being nearly as long as the central and stouter, the outer being much the shortest and feeblest: talons very acute, and unequal, but not highly curved. Type, *Aquila pernigra*, Nobis, *loc. cit.*

[N. B.—In Mr. Jerdon's Catalogue of the Birds of Peninsular India (*Madr. Jl.* No. XXIV, 68,) that naturalist remarks, that—"On the summit of the Neilgherries there is frequently seen a black Eagle, larger than the *Wokhab* (*Aquila Vindhiana*, Franklin), but of which I was unable to procure a specimen. I have heard it is also

often met with in Coorg.”—And in the privately circulated *Supplement* to this catalogue, Mr. Jerdon describes the female, and mentions having examined three specimens of this “curious Eagle,” which he there classes as *Nisäetus ovivorus*, but with a double mark of doubt as to the genus; and he has since transmitted specimens of both sexes to the Society’s Museum by the title of *Ictinäetus ovivorus*, but subsequently to the arrival of the foregoing paper by Mr. Hodgson, with whose former description of the species Mr. Jerdon’s specimens accord in every particular. Moreover, with reference to the specific name bestowed by Mr. Jerdon, Mr. Hodgson had already stated that—“This is a shy bird, which adheres exclusively to the wild and mountainous tracts of the hills. Its body is entirely free from offensive odour and vermin, and its prey chiefly the Pheasants of the region it frequents, *as well as their eggs*.”

Mr. Jerdon, on the other hand, did not fail to notice the peculiar structure of the feet, and I quote the following from his very interesting description: “This remarkable Eagle I have placed for the present, though with doubt, under the genus *Nisäetus*. It differs from it in superior length of wing and tail—its shorter tarsus, shorter toes, and more especially in their comparative size—the outer toe and claw being remarkably small, and the inner claw of very great size. The extreme shortness of the outer toe is, as far as I can recollect, peculiar to it among the diurnal *Raptores* of this country, though common among the Owls. Its habits, too, are, so far as I know, peculiar, and differ from those of the other Indian Eagles. \* \* \* It hunts about the edges of the hills more generally than on the higher parts of the table-land, and most frequently over bushy ground, though I have also seen it over forest, both on the top of the hills and half way down the Coonoor ghaut. It sails slowly along with very little motion of the wings, usually very close to the ground, hunting tolerably regularly, not unlike the Harriers, and like them hardly ever alights except for the purpose of feeding.

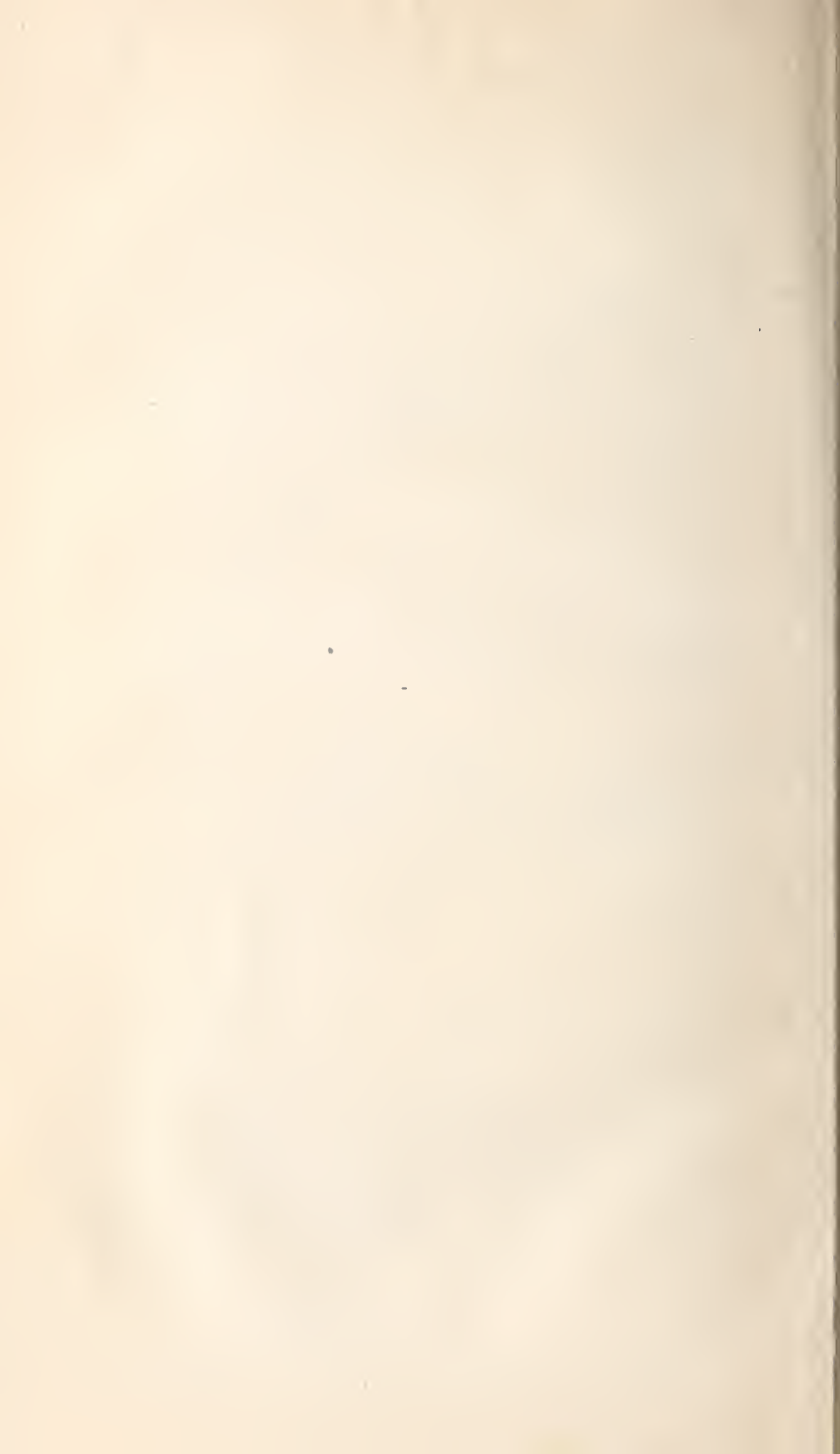
“In the three specimens I have examined, I found that eggs and nestlings had formed its only food. Among these I recognized the eggs of the Hill Quail (*Coturnix erythrorhyncha*), of the *Malacocercus Somervillei*, and of some Doves (*Turtur tigrina* and *T. Cambayensis*), beside others I did not know, and several nestlings. I have seen it, since I procured my specimens, alight for a few seconds on a large bush over which it had been circling for some time, and apparently devour something. I found in this bush a Dove’s nest empty, which had evidently been robbed. This Eagle thus appears to be habitually a robber of bird’s nests; and as Doves, as well as some other birds, breed throughout the whole year, it can probably sustain itself mostly on its favorite food, though it doubtless occasionally destroys young, feeble, or sickly birds, and perhaps reptiles.”

The *Limnaëtus unicolor* is likewise a plunderer of nests, though I cannot say of the eggs contained in them. A fine specimen, presented by Mr. Frith to the Society, and shot in Mymunseng, first attracted that gentleman’s attention by the alarm which was manifested upon its approach to a large banyan tree, upon which were several of the deep and massive nests of the *Sturnus contra*, one of which it immediately proceeded to pull to pieces, to rob of its contents, in which operation it was shot. It is not, therefore, improbable that the same habit will prove to be more or less prevalent among various true Eagles, *Spizaëti* (*Nisäetus*, Hodgson), and Buzzards. The specimen adverted to agrees perfectly with the description of *Spizaëtus hastatus*, Lesson, in the ‘*Zoologie du voyage de M. Belanger*,’ and I believe it also to be the *Falco limnaëtus*, Horsfield, v. *F. unicolor*, Temminck, constituting the *Limnaëtus unicolor*, Vigors. *Cur. As. Soc.*—E. B.



*Cymindinæ Heteropus mihi H. Peringra mihi.*

2 Inside of Foot size of nature



*Proceedings of the Asiatic Society.**(Friday Evening, 10th February 1843.)*

The monthly meeting of the Society was held on Friday evening, the 10th instant, the Honorable the President in the Chair.

The following gentlemen proposed at the last meeting, were ballotted for and duly elected :—

The Rev. CHAS. IRVINE, of St. Xavier's College.

Lieut. BAIRD SMITH, B. E.

BABOO COSSINATH BHOSE.

JOSEPH ST. POURCAIN, Esq. Chandernagore.

The usual communication was ordered to be made to them.

The following Members were proposed : Professor Mohl, Secretary of the Asiatic Society of Paris, proposed as an Honorary Member by H. Torrens, Esq. and seconded by R. Houston, Esq. It was referred, as in like cases, to the Committee of Papers, to report on the propriety of conferring this distinction.

Dr. TRANTER, Malwa Contingent, proposed by the Honorable the President, seconded by Mr. Masters.

The Acting Secretary reported to the meeting that he had enquired as to the state of the account of the transcription of the Veds,\* as requested by Major Troyer's letter, and that it appeared by reference to the Journal, vol. VIII. page 531, that the transaction was then taken over from Mr. James Prinsep's executor, and that a balance was due to the Society of rupees 233 : 7 : 15, from the French Government, which would now be claimed. Instructions had been sent to Benares to Judoonath l'undit, who formerly conducted the transcription, requesting him to continue it.

It farther appeared, as to the copies of the 4th Vol. of the Mahabarata, that a box containing 56 copies of it, with 56 copies of the Index, had been sent from the rooms in April 1840, and by an Office Memorandum, that the case had been shipped on the 9th September 1840, by Government on the ship *Larkins*, with a letter from Mr. Torrens ; but no acknowledgment of the arrival of the case had been received from Europe. The Acting Secretary stated, that he had written full particulars of the above to Major Troyer.

The Acting Secretary stated, that under the orders of the President, a box containing the following works, in all 13 volumes, had been sent to His Highness the Pacha of Egypt from the Society by Dr. Wise, who had sailed on the *India* this morning. No letter could accompany the donation, be-

\* Proceedings for January, 1843.



cause it was not possible to procure the proper kind of paper on which to write it during the Mohurram.

*Books delivered to DR. WISE, for the Pasha of Egypt, on the 8th February, 1843.*

Fatawa Alemgéri, Vols. 1 to 6.

Inaya, Vols. 2d, 3d, and 4th.

Jawami ul Ilm ul Riazí, one copy.

Anis ul Musharrahin, one ditto.

Sharaya ool Islam, one ditto.

Khazanat ul Ilm, one ditto.

The Acting Secretary then read the following Minute, relative to the state of part of the premises.

*Minute.*

We, the undersigned, having, at the request of the Hon'ble the President and the Acting Secretary, examined the screen wall on the North side of the Society's House, are of opinion, that it is not in a dangerous state; that the cracks are only due to slight sinkings of other parts of the building very common in Calcutta; and that it is well supported by the manner in which the new building and its roof have been carried up and laid on. We therefore recommend, that the arch of the Eastern door only, be renewed, as being all that is at present required.

W. N. FORBES, *Lieut.-Col.*

Calcutta, Jan. 2, 1843.

A. IRVINE, *Major.*

He further represented the utility of a Skylight over the Stair-case, which was ordered to be referred to the Committee of Papers.

The following Books were presented and purchased :—

*List of Books received for the Meeting, on the 10th February, 1843.*

The Calcutta Literary Gleaner, February 1843, Vol. i., No. 12. Presented by the Editors.

The Calcutta Christian Observer, New Series, February 1843, Vol. iv., No. 28. Presented by the Editor.

The Oriental Christian Spectator, 2nd Series, Bombay, 1842, Vol. iii. No. 12. Presented by the Editor.

Specimens of the Popular Poetry of Persia, translated by A. Chodzko, London, 1842, 8vo. Purchased.

J. J. Bayer's, Gemmarum affabre sculptarum thesaurus, 1720, fol. Presented by H. Torrens, Esq.

Gazophilacium Linguae Persarum, Authore P. Angelo a S. Joseph. Amstelodami, 1684, fol. Presented by H. Torrens, Esq.

Piddington's Tabular View of the Generic Characters of Roxburgh's Flora Indica. Presented by the Author.

Piddington's English Index to the Plants of India. Calcutta, 1832, 8vo. Presented by the Author.

Actes de L'Academie Royale des Sciences, Belles-Lettres et Arts de Bordeaux, 1840, 2eme, Anneé, 1er. á 4e. trimestres, 1841, 3eme. Anneé, 1er. á 4e. trimestre et.

1842, 4eme. Année, 1er. trimestre. Presented by the Academie Royale de Bordeaux.

Meteorological Register for December, 1842, from the Surveyor General's Office.

A Chinese Wood Engraving and Description of the Porcelain Tower of Nankin. Presented by J. H. Stocqueler, Esq.

Read the following letter, received through the Private Secretary to the Right Honourable the Governor General :—

*To the Secretary of the Asiatic Society of Bengal, Calcutta.*

*Washington, 1st June, 1842.*

DEAR SIR,—I have the honor to transmit to you copies of the constitution, and list of Members, of the National Institution for the promotion of Science lately established in this city, together with the first and second Bulletins of its Proceedings, and to request you to lay them before your Society, that its Members may become acquainted with the existence and objects of the National Institution, with a view to future correspondence.

I have the honor to be with great respect,

*Approved.*

Your most obedt. Servant,

J. R. POINSETT,

FRANCIS MARKOE, JUN.

*President National Institution.*

*Corresponding Secretary.*

*To the Secretary of the Asiatic Society of Bengal, Calcutta.*

*Office of American and Foreign Agency,*

*New York, June 9, 1842.*

SIR,—With reference to my respects of the 6th April ultimo, informing you of the enrolment of your Society among the Correspondents of the National Institution, upon my proposal, I have now the honor to transmit you the annexed letter of the Corresponding Secretary thereof of the 1st instant, and am, with great respect, Sir,

Your most obedt. Servant,

AARON H. PALMER,

*Corresponding Member of the National Institution.*

Ordered.—That upon receipt of the papers referred to, the whole be duly acknowledged, with expression of the Society's desire to co-operate with the National Institution of Washington.

Read the following letter received through Mr. Gladstone of Messrs. Gillanders and Co. :—

MONSIEUR,

*Bordeaux, le 30 Juillet 1842.*

L'Academie Royale de Bordeaux a reçu en 1839, de la Societe Asiatique de Calcutta, 24 cahiers comprenant le recueil de les travaux pendant les années 1836-1837; en meme temps elle reçut 4 volumes publiés par la meme Société sur la recherche des Antiquités, des Arts, des Sciences, et de la Litterature de l'Asie.

Elle a cherché plusieurs fois l'occision de vous adresser l'expression de sa gratitude pour un don aussi précieux et aussi de vous faire parvenir le recueil des actes qu'elle publie régulièrement depuis plusieurs années; comme elle n'a rien reçu de la Société Asiatique depuis 1839, elle a lieu de craindre que ses envois n'aient pas été fidèlement remis.

En consequence elle a accepté les offres bienveillantes de Mr. Gautier un des ses membres, qui dirige un navire sur Calcutta, pour vous adresser ses remerciemens vous faire don de ses travaux, et vous prier de continuer un échange dont elle sent tous le prix : elle serait heureuse de former des relations durables et suivies avec une Société qui a rendu et rend d'important services aux Sciences, aux Lettres, et aux Arts, par ses lumieres, son zèle et ses belles publications.

J'ai l'honneur d'être, Monsieur, votre très dévoué Serviteur,

C. H. VALAT, *Secret. Gen. de l'Acad.*

*A M. le Secrétaire de la Société Asiatique de Calcutta.*

Ordered.—That the same, with the donation of Books be duly acknowledged.

Read letter from J. Beaufort, Esq., Seory, as follows :—

Last month the Collector of Beerbhom sold by auction a good deal of property belonging to the temple at Deoghur, amongst which was a heap of coins. Now, I cannot pretend to any knowledge of Numismatics, and I cannot tell whether the Society would value any of these coins; but as I thought it possible that some few of them might be curious, I bought some of each kind, and enclose them to you, for the benefit of the Society.

Should they prove to be of no value, I shall not care what becomes of them.

Your's truly,

J. BEAUFORT.

N. B. The following is a List of the Names under which I bought them.—The name is written inside of each paper.

The Coins, 68 in number, were found to be as follows :—

Benares Rupee,	....	....	...	....	1 Piece.
Patna, ....	....	....	....	....	1
Nepal, ....	....	....	....	....	1
Benares 2 Annas,	....	....	....	....	5
Jhansee, ....	....	....	....	....	1
Arcot, ..	....	....	....	....	4
Assam, ....	....	....	....	....	4
Nagpore, ...	....	....	....	....	4
Lucknow,	....	....	....	...	4
Nepal, ....	....	....	....	....	2
Unknown, ..	....	....	....	....	4
Assam Anna,	....	....	....	....	12
Arcot, ....	....	....	....	....	1
Nepal, ....	....	....	....	....	8
Unknown, ..	....	....	....	....	8
Assam Half Anna,	....	....	....	....	8

*Seory, January 16, 1842.*

Total, 68

Read extract of letter from D. F. McLeod, Esq. C. S. as follows :—

“ I have long by the way purposed intimating to you this as a remarkable philological fact. It was clearly ascertained by a German Missionary, named Mr. Loesch, who

was recently settled in this district, but sad to say, carried off with his companions by Cholera ; that the language spoken by our Gonds is fundamentally the same with the Canarese. Mr. L. had become familiar with the latter formerly at Mangalore and other places under the Bomhay Presidency ; and found himself able almost to converse with the Gonds, or at all events to make himself in a great measure understood by them by using this language ; and being a gentleman of great acquirements and philological acuteness, had he lived, I have no doubt he would have been able to throw much light on the interesting question of the origin of this people. It has been decreed otherwise, but were the fact generally known, Canarese scholars might be induced to turn their attention to the subject.

Read a note from Dr. Campbell of Darjeeling, on the " Bora Chung," or Burrowing Fish, which was referred to the Editor of the Journal for publication. Also a paper from Lieut. Shortrede, of the Trigonometrical Survey, on Meteors observed by him on the night of the 13th August, 1842. Referred to the Journal for early publication.

The thanks of the Society were ordered to be expressed to the various donors and contributors of all the foregoing.

Reports of the Librarian were read as follows :—

H. PIDDINGTON, Esq.

*Acting Secretary Asiatic Society.*

SIR,—My report of this month refers to the collection of Roman, Greek, Indo-Grecian and Indo-Scythian coins in the cabinet of the Society, which have been arranged, numbered, and labeled, and I have now the pleasure of submitting to you three lists, exhibiting an arrangement, and a detailed description of the coins.

The Roman coins amount to 297, all of Roman Emperors, from Augustus down to the destruction of the Occidental empire. With the exception of a few, they are not remarkable for their rarity. Mr. J. Prinsep, in his description of the Roman coins in the possession of the Society, observes (*As. Jour.* Vol. I. p. 391,) that most of them were found in India, which would certainly give them some interest ; but those coins being no where specified, it is now impossible to identify them. A few of these coins are of silver, and none of gold ; the only gold coin and some silver ones, formerly in the cabinet, being lost. But a comparison of the present list with that of the late Mr. J. Prinsep will shew, that the cabinet has not been greatly diminished. I here place the lists in juxtaposition.

	<i>Coins at present in the cabinet.</i>		<i>Coins in the cabinet according to the statement of Mr. J. Prinsep.</i>	
Silver coin of Augustus	.....	1	.....	4
Copper coins ditto ditto	.....	2	.....	4
Copper coins of Tiberius	.....	1	.....	0
Ditto ditto of Claudius	.....	4	.....	0

	<i>Coins at present in the cabinet.</i>	<i>Coins in the cabinet according to the statement of Mr. J. Prinsep.</i>
Silver coins of Nero	..... 1	..... 2
Copper coin of Galba	..... 1	..... 1
Silver coin of Vespasian	..... 0	..... 1
Copper coins of ditto	..... 6	..... 6
Copper coins of Titus	..... 2	..... 1
Ditto ditto of Domitian	..... 1	..... 0
Ditto ditto of Nerva	..... 0	..... 2
Ditto ditto of Trajan	..... 8	..... 3
Ditto ditto of Hadrian	..... 9	..... 8
Ditto ditto of Lucilla	..... 3	..... 1
Ditto ditto of Antoniu	..... 11	..... 45
Ditto ditto of M. Aurel.	..... 15	..... 0
Ditto ditto of Faustina	..... 3	..... 4
Ditto ditto of Verus	..... 1	..... 0
Ditto ditto of Commodus	..... 23	..... 16
Ditto ditto of Septimius Geta	..... 0	..... 1
Ditto ditto of Julia	..... 1	..... 1
Ditto ditto of Severus	..... 8	..... 6
Ditto ditto of Maximinus	..... 0	..... 2
Ditto ditto of Mammaea	..... 1	..... 2
Ditto ditto of Gordianus	..... 5	..... 2
Ditto ditto of Philippus	..... 8	..... 8
Ditto ditto of Severa	..... 1	..... 0
Ditto ditto of Decius	..... 3	..... 6
Ditto ditto of Valerianus	..... 2	..... 0
Ditto ditto of Gallienus	..... 9	..... 9
Ditto ditto of Victorin	..... 8	..... 1
Ditto ditto of Tetricus	..... 3	..... 1
Ditto ditto of Aurelianus	..... 2	..... 3
Ditto ditto of Probus	..... 9	..... 9
Ditto ditto of Carus	..... 4	..... 0
Ditto ditto of Numerianus	..... 0	..... 1
Ditto ditto of Diocletian	..... 30	..... 41
Ditto ditto of Maximian	..... 30	..... 30
Ditto ditto of Constantin	..... 47	..... 28
Ditto ditto of Maxentius	..... 1	..... 1
Ditto ditto of Valens	..... 0	..... 3
Ditto ditto of Crispus	..... 1	..... 0
Ditto ditto of Licinius	..... 1	..... 0
Ditto ditto of Deceutius	..... 1	..... 0
Ditto ditto of Constantin M.	..... 2	..... 2



	<i>Coins at present in the cabinet.</i>	<i>Coins in the cabinet according to the statement of Mr. J. Prinsep.</i>
Ditto ditto of Constantius	..... 14	..... 12
Ditto ditto of Theodosius	..... 3	..... 2
Gold Coin of Arcadius	..... 0	..... 1
Copper Coin of Honorius	..... 0	..... 1
Ditto ditto of Justinianus	..... 1	..... 1
Ditto ditto of Justinus	..... 1	..... 1
Ditto ditto of Mauricius	..... 1	..... 1
Ditto ditto of Zimias	..... 1	..... 1

It would be undoubtedly desirable to have a complete series of Roman coins, but as such collection is not directly connected with the purposes of the Society, and as there are other objects the attainment of which is of much higher importance, it is perhaps not advisable to encourage an increase of these coins for the present.

On the other hand, it cannot be urged too much on the attention of the Society to enlarge the collection of the Indo-Grecian, Indo-Scythian and Hindoo coins, in which the cabinet is very deficient, their number amounting only to 116 specimens, most of which are moreover duplicates, and their legends, types, etc. generally effaced. General opinion seems to transfer to the Asiatic Society as an hereditary obligation, researches respecting the Antiquities and History of Afghanistan, which can be instituted with propriety only by means of a large collection of coins.

To form this devolves the more on the Society, as there are few Societies placed in a more favourable position for collecting those coins, than the Asiatic Society of Bengal.

I would also beg to draw the attention of the Society to a branch of coins which has been investigated in part only. I allude to the coins of the ancient Hindoo Kings, allied by their coins to the Greeks and their successors, and I need not say, how valuable such a collection may prove to supply the large blank of historical account from Azoka to the Mahomedan conquest.

Of Grecian coins the cabinet contains no more than sixteen, and I beg to observe, that additions, especially to those of the successors of Alexander, are also desirable, as many of their types are closely allied to the Indo-Grecian coins, and show in typical representation the influence which Grecian art and genius had on the development of Indian civilisation.

I take this opportunity of forwarding to you the list of books received into the Library during the past year, the number of which amounts to 260, an account of the Oriental publications from May 1838 to the 31st December 1842, and an abstract of the Oriental publications which have been sold from the 1st January to the 27th December 1842.

I have the honor to be, Sir,

Your obdt. Servant,

E. ROER,

*Librarian Asiatic Society.*

13th January, 1843.

## CATALOGUE OF THE COINS IN THE CABINET OF THE ASIATIC SOCIETY.

*A Catalogue of the Coins of Roman Emperors in the Cabinet of the Asiatic Society.**Augustus.**a. Silver.*

1 Obv. Cæsar Augustus...atriæ. Head of the emperor, well executed.—Rev....Caesares. Two figures, standing and supporting two shields, the one part covering the other. This coin is partly cut off, and undoubtedly the same with that, mentioned by Medioharhus, page 39, where the complete inscription is C. et L. Caesares Augusti F. Cos. Desig. Princ, Juvent.

*b. Copper.*

2 Obv. Caes. Aug. Head of the Emperor (much effaced).—Rev. Gloria. S. C. Type, Victory, in her right a wreath, in the left perhaps a tuha.

3 Obv. Divus Augustus S. C. Head of the Emperor. Rev. Diva Augusta. Type. A figure seated on a state-chair, holding in the right an ear, and in the left apparently a torch. B. C. 14. V. Medioharhi Num. Imp. Rom. p. 44.

*Tiberius Claudius Nero (A. D. 13—37.)**Copper.*

4 Obv. Head of the emperor (much effaced).—Rev. Γ Υ. A military figure, in the left a spear.—Donor H. Torrens, Esq.

*Tiberius Claudius (A. D. 41—54.)**Copper.*

5 Obv. Imp. Claudius. Head of the emperor with radiated crown.—Rev. Apollini fons. Type. Apollo standing, in the right a palm branch, with the left placing something on an altar.

6 Obv. The same legend and type.—Rev. Aequitas Aug. The figure of Equity standing.

7 Obv. The same legend and type.—Rev. Felicitas Aug. A figure standing, in the left a cornucopiæ.

8 Obv. (Clau?) dius Aug. Head of the Emperor with radiated crown.—Rev. Foa. P. Jupiter standing holding thunderbolt and spear, found at Patna.—Donor — Rose, Esq.

*L. Domitius Nero. (A. D. 54—68.)*

## 1. ROMAN COINS.

*Copper.*

9 Obv. Legend illegible. Head of the emperor.—Rev. Securitas. A figure seated, in the left a spear, and approaching the head with the right (A D. 54) Med. p. 90. Found at Patna.—Donor — Rose, Esq.

10 Obv. Nero Claudius Caes. Au : Head of the emperor with a wreath of laurels.—Rev. (R) om (a) Type not much discernible, probably Roma, seated on trophies.

## 2. EGYPTIAN COINS.

*Silver.*

11 Obv. ... ερω ... Κλαυ Κα ... Head of the Emperor with radiated crown.—Rev. Αυτοκρατ ..... An eagle, a palm-branch in its right.

12 Obv. ... .. αυ. ... The same as the preceding.

*Servius Sulpicius Galba (A. D. 68—69.)*

ROMAN COINS.

*Copper.*

13 Obv. Galba Imp. Caes. .... Head of the emperor. Rev. Legend and type indiscernible.

*Flavius Vespasianus (A. D. 69—79.)**Copper.*

14 Obv. (Imp.) Caes. Vesp. Aug. P. M. T. R. (...Cos) III. Head of the Emperor, wreathed with laurels.—Rev. Leg. Ceres August. S. C. Ceres standing, holding ears, and a cornucopiæ, A. D. 71.

15 Obv. (I) m (p) Caes Vesp. Aug. P. M. T. R. P. (III). Head of the Emperor, facing to the left.—Rev. P. (a x) August. S. C. A figure standing, in the left a caduceus. A. D. 71. V. Med. p. 113.

16 Obv. Imp. Caes. Vespasian, Cos. VIII. Head of the Emperor.—Rev. Ceres August. S. C. Ceres standing, in the right holding ears, in the left a spear, A. D. 77. V. Med. p. 116.

17 Obv. Imp. Caes. Vespasianus Aug. Cos. VIII. (The legend is running from the right to the left) Head of the Emperor with radiated crown.—Rev. Ceres August. Type, Ceres.

18 Obv. Imp. Caes. Vespasian, Aug. Cos. VII. P. P. Head of the Emperor, wreathed with laurels.—Rev. Provident S. C. Type. A temple, A. D. 77.

19 Obv. Divus Aug. Ves. ... ianus. Type as in 18.—Rev. (Aeq) nitas August, S. C. The type of Equity. A. D. 79. V. Med. p. 117.

20 Obv. Vespasian, Aug. Head of the Emperor (almost obliterated).—Rev. illegible, S. C. A figure standing.

*Titus Flavius Vesp. (A. D. 79—81.)**Copper.*

21 Obv. T. Caes. Imp. Aug. .... Cos. VII. Censor R.—Rev. Judæa Capta. S. C. Two figures under a palm-tree, effaced. A. D. 77. V. Obv. Med p. 123.

22 Obv. Leg. illegible. Head of the Emperor. Rev. Providentia. Type, A temple.

*T. Flavius Domitianus Vesp. (A. D. 81—96.)**Copper.*

23 Obv. Imp. Caes. Domitian. Aug. Germ. Cos. XI. Head of the Emperor, crowned with laurels. Rev. Germania Ca | p | ta. | S. C. A trophy, on the left a figure (the Emperor) with a shield, kicking another, seated near the trophy. A. D. 85.

*Nerva Trajanus (A. D. 98—117.)**Copper.*

22 Obv. Im. aes. Nerva Trajan. Aug. ... Head of the Emperor, crowned with laurels. Rev. O. ... Tr. Pot. .... Cos. II. (?) S. C. A figure standing before an altar.

23 Obv. Imp. Caes. Nerva Traja. .... the same type. Rev. Effaced.

24 Obv. Aug. Ger. Tac. P. M. Tr. P. .... The same. Rev. .... o Ro. S. C. Type. A figure standing, and holding in the left a cornucopiæ.

25 Obv. ... vae Trajano Aug. Germ. Tac. P. M. Tr. Cos. X. P. P. The same type. Rev. (Opti mo (Principi) : A helmeted figure, seated on trophies and holding a spear in the left, and a Victory, as appears, in the right.

26 Obv. Imp. Caes. Nerva Trajan. Aug. Germ. Dacio. Head of the Emperor with radiated crown. Rev. .... P. R. VII. Imp. IIII. Cos. V. P. S. C. A figure, seated in a reclining posture, A. D. 103.

27 Obv. .... a Caes. Aug. P. Ma. Tr. P. Cos. III (I) Head much effaced. Rev. .... August. S. C. A figure standing, in the left a cornucopiæ.

28 Obv. .... P. M. Tr. P. .... Head of the Emperor with a crown of laurels. Rev. | Optim | o Principi S. C.

29 Obv. .... anus Aug. Cos. IIII. Bearded head of the Emperor Rev. ... or (gloria) S. C. A female, in the right a sacrificial vessel, in the left a cornucopiæ.

30 Obv. Legend illegible. Head of the Emperor with a laurel crown. Rev. Salu ... S. C. A female, holding with the left a sacrificial vessel over an altar.

### *P. Aelius Hadrianus (A. D. 117—138.)*

#### *Copper.*

31 Obv. Hadrianus Augustus. Head of the Emperor. Rev. Feliatati Aug. Cos. III. P. P. The Pretorian ship. A. D. 129 (V. Med. page 130.)

32 Obv. The same legend. Head of the Emperor, crowned with laurels. Rev. Cos. III. A man riding on horseback.

33 Obv. Hadrianus Augustus P. P. Head of the Emperor with radiated crown. Rev. Hilaritas (P.) R. Cos. III. S. C. A figure standing and having two children at its feet. A. D. 129, vid. Med. p. 130.

34 Obv. Hadrianus Aug. Cos. III. P. P. Head of the Emperor. Rev. Two figures standing and having their hands joined. Leg. Felicitas Aug. S. C., A. D. 130 vid. Med. p. 132.

35 Obv. Hadrian. Aug. Cos. .... Head of the Emperor, crowned with laurels. Rev. Fel. ic. a .... S. C. A figure standing, and holding in the left a cornucopiæ.

36 Obv. | Traj | anus Had | rianus | Head of the Emperor crowned with laurels. Rev. Legend effaced. Type. A figure standing.

37 Imp. Cæsar Traj. Hadri. .... Head of the Emperor with radiated crown. Rev. Pietas Augusti. S. C. A figure standing before an altar.

38 Obv. Imp. Caes. Trajanus Hadrianus. .... Cos. II. Bearded head of the emperor with radiated crown.

39 Obv. Imp. Trajan Hadrianus. Head of the Emperor with radiated crown and part of the bust. Rev. .... Cos. Concordia. A figure seated.

### *Lucilla, L. Aelii uxor.*

#### *Copper.*

40 Obv. Lucilla Augusta. Head of Lucilla with part of the bust. Rev. L. P. | iet | as S. C. A female standing before an altar, with a small box and a sacrificial vessel. S. Med. p. 190.

41 Obv. The same legend and type. Rev. Legend illegible. A figure seated with sacrificial vessel and cornucopiæ.

42 Obv. The same legend and type. Rev. Venus S. C. Venus standing, in the right a monkey and in the left a spear. Med. p. 190.—Donor H. Torrens, Esq.

### *T. Aelius Hadrianus Antoninus Pius. (A. D. 138—161.)*

#### *Copper.*

43 Obv. Antoninus Aug. Pius Tr. P. Cos. III. Head of the Emperor with radiated crown. Rev. Salus publica S. C. A. female figure, in the left a spear, the right raised over an altar.

44 Obv. Antonius Aug. Pius P. P. Tr. P. Bearded head of the Emperor, with a crown of laurels. Rev. III. Type of Sol.

- 45 Obv. Antonius Aug. Pius. The same type. Rev. Munificentia Aug. Cos. IV. An elephant moving.
- 46 Obv. .... ninus Aug. Pius P. P. Type as in 44. Rev. Salus. .... Cos. IIII. Type as in 43.
- 47 Obv. Antoninus Pius Aug. Type as in 43. Rev. P. M. Tr. P. XVII. Imp. .... Cos. IIII. A figure seated on trophies, in the left a spear, in the right some thing indiscernible.
- 48 Obv. .... ninus Aug. Pius P. P. Type as in 43. Rev. P. T. XX. S. .... S. C. Jupiter standing, with thunderbolt and spear.
- 49 Obv. Antonius Aug. Pius P. P. Tr. P. (X) XII. Type as in 43. Rev. Cos. IIII. S. C. A figure standing, and holding a cornucopiæ in the left, and a scale in the right. A. D. 150.
- 50 Obv. Ant. .... us P. P. Tr. P. XII. Type as in 26. Rev. .... rtuna o | bse | quens. Cos. IIII. S. C. The type of fortune. A. D. 150. Med. p. 204.
- 51 Obv. Antonius Aug. Pius P. P. Tr. P. XXIII. Type as in 43. Rev. Pietati Aug. Cos. III. S. C. Type. A figure standing, holding in the right a scale, and in the left a cornucopiæ, at the feet two children, A. D. 161. Vid. Med. p. 205.
- 52 Obv. Antoninus Aug. Pius R. P. Tr. P. ... The same type. Rev. ... Aug. S. C. A figure standing, holding in the right a wreath over an altar, and in the left a spear.
- 53 Obv. Antoninus Pius Aug. Head of the Emperor with a crown of laurels. Rev. — Cos. ... S. C. A naked Hercules standing, and holding in the right the club.

*M. Aurelius Verus Antoninus (A. D. 161—180.)*

ROMAN COINS.

*Copper.*

- 54 Obv. Leg. Aurelius Cæsar Aug. Pic. F. Head of M. Ant. Rev. | Tr. P. | ot III Cos. II. S. C. A female figure standing, in the right apparently holding an ear, in the left a basket. A. D. 149. V. Med. 213.
- 55 Obv. | M. An | tonius Pius Aug. Germ. Head of the Emperor crowned with laurels. Rev. Venus Victri | x. | A figure standing. A. D. 164 (?)
- 56 Obv. M. Aurel. Antoninus Aug. Armeni. ... The same type. Rev. ... XIX. Imp. I. Cos. ... A figure standing, in the right a walking stick, at its feet a globe. A. D. 165.
- 57 Obv. M. Aurel. Antoninus Aug. Arm. Parth ... The same type. Rev. Tr. Pot. XX. Imp. ... S. C. A Victory standing, in the left hand a palm, and with the right having raised on a palm-tree a shield, in which is written Vic. Part. A. D. 165. V. Med. p. 219.
- 58 Obv. M. Antoninus Aug. Arm. Pa. ... The same type. Rev. (Tr. Pot) XXI. Imp. Cos. III. S. C. A victory, holding in the right hand a branch of laurels, and in the left a palm. A. D. 167. V. Med. 220.
- 59 Obv. M. Antoninus Aug. Germ. Tr. P. XXIX. The same type. Rev. Imp. VII. Cos. III. S. C. A military figure moving, in the right the Roman eagle, in the left some trophy. A. D. 167.
- 60 Obv. Imp. Caes. M. Aur. Antonius Pius. ... The same type. Rev. .... XXXII. Cos. III. P. P. S. C. A figure standing, in its right a crown over a small altar.
- 61 Obv. M. A. Antoninus. Aug. Tr. P. XXXII. (?) The same type. Rev. Imp. VIII. Cos. III. S. C. Type. A Victory.
- 62 Obv. Holding a wreath with the right. rel. Antonius Aug. Pius Tr. P. XXXII. The same type. Rev. Imp. X. Cos. III. Type as in 61. P. R. S. C. A. D. 172. V. Med. p. 227.
- 63 Obv. M. Aurel. Antonius Aug. Tr. P. XXXIV. Head of the Emperor with radiated crown. Rev. Imp. ... Cos. P. P. S. C. Type as in 61. A. D. 180.
- 64 Obv. Divus M. Antoninus Pius. Bearded head of the Emperor, Rev. Cons | ecrati | o S. C. An eagle standing on a globe. A. D. 180. V. Med. p. 228.
- 65 Obv. M. ... toninus Aug. Type. Head of the Emperor with radiated crown. Rev. Salus Aug. Cos. ... S. C. Typc. A female figure, the left hand raised over an altar.



66 Obv. Imp. Cæs. ... us Antoninus Pius Aug. Type as in 63. Rev. | Pax Aug. | ust; S. C. Type indiscernible.

67 Obv. ... M. A. ... Germ. P. M. Head of the Emperor with a crown of laurels. Rev. Gen. Cola. A Genius, standing before an altar with a sacrificial vessel and a cornucopiæ.

*b. Egyptian.*

68 Obv. Map Avp ... Head of the Emperor. Rev. .... Cos. MHΓ ...  
ΩΝΜΗΓΑ ... ΚΟΕ.

*Annia Faustina M. Antonini.*

*Copper.*

69 Obv. Faustina Augusta. Head of the Empress (effaced). Legend illegible ... S. C. A figure standing with cornucopiæ and sacrificial vessel.—Donor H. Torrens, Esq.

70 Obv. Faustinae Aug. Pie Aug. F (i, V. Rev. Pudicitia. A figure seated.

71 Obv. | Faus | tina Augusta | Head of the Empress. Rev. Legend illegible. A figure standing before an altar.

*L. Aelius Verus.*

*Copper.*

72 Obv. ... (Cæs. L.) Aurel. Verus Aug. Head of Verus, crowned with laurels. Rev. Concord. Augustor. Tr. P. Cos. II. S. C. The two Cæsars, joining their hands. A. D. 161.

*L. Aelius Aurelius Commodus (A. D. 180—192.)*

*Copper.*

73 Obv. Imp. Aelius Cæsar Antoninus. Head of Commodus. Rev. A figure standing.

74 Obv. Imp. L. Ael. Cæs. .... oninus Pius. Bearded head of the Emperor. Rev. Tr. Pot... Cos. Des. II. Type. A figure standing, holding in the right a branch and in the left a cornucopiæ, A. D. 178.

75 Obv. Commodus Antoninus Aug. The same type. Rev. .... Vota D (e) c (enn | S) u | s | e Tr. P. VI. Imp. IV. Cos. (III) P. S. C. A stolated figure standing, and holding with the right a sacrificial vessel over an altar. A. D. 181. Vid. Med. p. 246.

76 Obv. M. Commodus Antoninus..... The same type. Rev..... Imp. VI. S. C. Type. A figure standing, in the right a caduceus, and in the left a shield, A. D. 182.

77 Obv. Leg. and type as in No. 74. Rev. T. R. (P.) VIII. Imp. V. IIII. P. P. S. C. Mars moving, in the right a Victory, in the left a javelin. A. D. 183. Vid. Med. p. 248.

78 Obv. The same legend and type as in 41. Rev... ... mp V. Cos. IV. The same type; duplicate of No. 77.

79 Obv. M. Commodus... The same type as in No. 75. Rev..... VIII. Imp. VI. Cos. IV. P. P. S. C. A helmeted figure | seated on trophies, holding with the left a spear, and with right a Victory. A. D. 183. Vid. Med. 248.

80 Obv. Commodus... ninus Aug. Fi... Head of the Emperor with radiated crown. Rev. Imp. VI. Cos. IIII. P. S. C. Minerva moving, a javelin in the right, in the left a shield.

81 Obv. Aelius Caesar Aug. ... Bearded head of Commodus with part of the bust. Rev. Tr. Pot. VIII. Cos. II (11) S. C. A female figure holding a sacrificial vessel over an altar. A. D. 183.

82 Obv. M. Commodus. A | nt. P. Feli | x Aug. Brit. Type as in No. 77. Rev. XI. Imp. VII. (1). Cos. (V.) S. C. Type. A figure standing, in the right a scale, in the left a cornucopiæ. A. D. 186. Vid. Med. p. 251.

83. Obv. M. Commodus Ant. P. Felix Aug. Brit. Type as in No. 75. Rev. | V. | rtuti Aug. P. N. .... Imp. VIII. Cos. (V.) ... S. C. Type. A helmeted soldier standing, in the right a Victory, in the left a spear, and at the feet a shield. A. D. 187. Vid. M. p. 252.

84 Obv. Comm. Ant. P. Felix (Brit.) The same type as in No. 75. Rev. r. P. XIII. Imp. VIII. Cos. V. P. (P.) S. C. exergue. For. Re | d | Fortune seated, in the right a team (over a globe,) in the left a cornucopiæ. A. D. 187. Vid. Med. P. 252.

85 Obv. M. Comm. Ant. (P.) Felix Aug. Brit. Type as in No. 79. Rev. (P.) M. (T) r P. XII. (1) p. VIII. Cos. V. P. P. S. C. A Victory moving, in the right a crown of laurels. A. D. 188. Vid. Med 253.

86 Obv. ... mmod. Ant. P. Felix Aug. Brit. The same type as in No. 75. Rev. Gen. A (ug. Ferlii) (P. M. Tr. P. XV.) Imp VIII. (Cos VI.) S. C. A Genius standing and holding with the right a sacrificial vessel over a burning altar, and in the left a cornucopiæ. A. D. 190. Vid. Med. 255.

87 Obv. L. Ael. Aur. Commod Aug. P. Fel. The same type as in No. 75. Rev. .... XVII. Imp. VIII. Cos. VII. P. P. S. C. A figure standing, in the right apparently a caduceus, in the left a cornucopiæ. A. D. 192.

88 Obv. .... Aurel. Comm. Aug. P. Fel. The same type. Rev. Tr. P. XVII. Imp VIII. Cos. VII. The same type. Duplicate of No. 87.

89 Obv. .... Imp. Caes. ... Commodus. The same type as in No. 75. Rev. Illegible. .... S. C A figure standing, in the right a spear, in the left a shield.

90 Obv. M. Commodus Antoninus Aug. The same type as in No. 75. Rev. Legend illegible. S. C. Type. A Victory, holding with both hands apparently a military sign.

91 Obv. Legend illegible. Head of Commodus. Rev. Legend illegible. S. C. A figure seated holding in the right a globe, and leaning with the left on the chair.

92 to 95 Three Coins of Commodus.

### *Septimius Severus, (A. D. 194—111).*

#### *Copper.*

96 Obv. | L. S. | ept. Sev. Pert. Aug. Bearded head of the Emperor, with a crown of laurels Rev. Legend illegible. S. C. A figure standing.

97 Obv. .... rus Aug. ... ax. Head of the Emperor, with a crown of laurel. Rev. .... VIII. Cos. IIII Three trophies raised on poles.

98 Obv. Legend illegible ; otherwise the same as the preceding.

### *Julia Aug. (Uxor Severi.)*

#### *Copper.*

99 Obv. Julia | Do | mna Aug. Head of Julia. Rev. Victrici V | ener | i | S. C. Venus standing, half dressed, leaning on a column with the right, and holding an apple with the left. Med. p. 282.

### *Alexander Severus, (A. D. 225—235.)*

#### *Copper.*

100 Obv. Imp. Caes. M. Aur. Sev. Alexander. Head of the Emperor with a crown of laurels and part of the bust. Rev. | Provide | ntia Deorum. S. C. The type of Providentia. A. D. 222. Vid. Med. p. 318.

101 Obv. .... xand. Aug. Head of the Emperor almost obliterated | Virt | us. Aug. A figure standing, in the left a spear, and in the right apparently a globe. A. D. 228. Vid. Med. p. 322. Found at Patna. — Donor — Rosc, Esq.

102 Obv. Imp. Sev. Alexander Aug. The same type. Rev. .... Tr. P. VIII. Cos. II. S. C. A figure standing.

103 Obv. The same legend and type. Rev. P. M. Tr. P. VIII. Cos. II. (1) P. S. C. A figure standing, holding in the left a staff in a transversal direction.

104 Obv. The same legend and type. Rev. P. M. Tr. P. VIII. Cos. S. C. A soldier (the emperor, says Mediobarbus) holding in the right hand a globe, in the left a javelin, and kicking with the right foot a helm. A. D. 230. V. M. p. 323.

105 Obv. Imp. Alexander Pius Aug. The same type. Rev. .... XIII. Cos. III. S. C. The type of Sol moving. A. D. 234.

106 Obv. The same legend and type. Rev. Jovi Propugnatori. S. C. Type. Jupiter holding in its right the thunderbolt.

107 .... Imp. Alexander Pius Augustus. The same legend and type. Rev. Providentia Aug. S. C. The type of Providentia.

### *Julia Mamaea (mater Alexandri Severi.)*

#### *Copper.*

108 Obv. Julia Mamaea Augusta. Head of Julia, with part of the bust. Rev. Fecunditas Augustae. S. C. A figure standing, and holding in the left a cornucopiae. Med. p. 326.

### *Gordianus Imp. (A. D. 283—244.)*

#### *Copper.*

109 Obv. Imp. Gordianus Pius Fel. Aug. Head of the Emperor, with a crown of laurels. Rev. Liberalitas Aug. III. S. C. A figure standing and holding in the right a die, and in the left a cornucopiae. A. D. 242. V. Med. p. 339.

110 Obv. Imp. Gordianus Pius. .... The same type. Rev. ... Tr. P. IV. Cos. ... A figure seated, in the right a branch. A. D. 241. Vid. Med. p. 339.—Donor H. Torrens, Esq.

111 Obv. Imp. Caes. M. Aut. Gordianus Aug. The same type. Rev. Gloria. .... S. A. Victory standing.—Donor H. Torrens, Esq.

112 Obv. Imp. Gordianus Pius Fil. (III ?) Rev. Pax Aeterna. S. C. Type of Pax, (much effaced.) Donor H. Torrens, Esq.

113 Obv. Legend illegible. Head of the Emperor, with a wreath of laurels. Rev. A figure standing.

### *Philippus Arabs. (A. D. 242—49.)*

#### *Copper.*

114 Obv. Imp. M. Jul. Philippus Aug. Bearded head of the Emperor with a crown of laurels. Rev. Felicitas Temp. A figure standing, in the right the caduceus, and in the left the cornucopiae. A. D. 249. Vid. Med. p. 343.

115 Obv. The same Legend and Type as No. 114. Rev. Principi Juvent. S. A. A figure clothed in military garments (figura paludata) in the right a globe, and in the left a spear. A. D. 247. Vid. Med. p. 350.

116 Obv. The same Legend and Type. Rev. Aequitas. Aug. S. C. The type of Equity standing. A. D. 248. Vid. Med. p. 346.

117 Obv. Leg. Imp. ... ppus Aug. The same Type | ae | | culares | Aug. A stag standing. A. D. 248. Vid. Med. p. 345.

118 Obv. The same Legend as No. 114. Head of the Emperor, with radiated crown. Rev. A monument, on which is written Cos. III. Leg. S aecula. ... A. D. 248. Med. p. 346.

119 Obv. The same Legend and Type as No. 114. Rev. Liberalitas Aug. III. Two Emperors, seated on their subscellia. A. D. 248. Med. p. 346.

120 Obv. The same Legend and Type. Rev. Leg. .... Aug. Type. A figure standing, in its left holding a cornucopiæ.

121 Obv. Imp. M. Jul. Philippus. Bearded head of the Emperor, with a crown of laurels.—Rev. Saeculum Novum, S. C. A temple supported by eight columns, in the midst of which a figure is seated. A. D. 248. Vid. Med. p. 346.

*Marcia Otacilia Severa (Philippi Imp. Uxor.)*

*Copper.*

122 Obv. Marcia Otacilia Severa. Head of the Empress. Rev. Concordia Aug. S. C. A Concordia, with cornucopiæ and sacrificial vessel.

*Cn. Messius Quintus Trajanus Decius. (A. D. 249—250.)*

*Copper.*

123 Obv. Imp. C. M. Q. Trajanus Decius Aug. Head of the Emperor, with a crown of laurels. Rev. Dacia. S. C. A figure standing, and holding with the right apparently a military sign.

124 Obv. Imp. .... M. Q. Trajanus Decius Aug. Head of the Emperor, with radiated crown. Rev. | liberali | tas Aug. S. C. A standing figure holding in the right a bag, and in the left a cornucopiæ.

125 Obv. Imp. .... us Dec. ? Head of the Emperor, with a crown of laurels. Rev. Liberalitas Aug. A figure standing, and holding in the left a cornucopiæ.

*P. Licinius Valerianus. (A. D. 254—260.)*

*Copper.*

126 Obv. Imp. C. P. Lic. Valerianus ? Aug. Head of the Emperor, with a wreath of laurels. Rev. Concord. S. C. A standing figure, holding in the right a sacrificial vessel, and in the left a cornucopiæ. A. D. 254.

127 Obv. Imp. C. P. Lic. Valerianus. Aug. Head of the Emperor. Rev. Legend illegible, and the type much effaced.

*Gallienus. (A. D. 254—268.)*

*Copper.*

128 Obv. Gallienus Aug. Head of the Emperor with radiated crown. Rev. E. G. (X) I. .. Cl. VI. P. VI. T. Neptune standing, in the right a trident, in the left apparently a dolphin. A. D. 259. Vid. M. p. 373.

129 Obv. The same legend and type. Rev. elic. .. A figure seated, holding in its right a palm branch.

130 Obv. The same legend and type. Rev. Leg. Apollo. A figure standing.

131 Obv. The same legend and type. Rev. Probit. A female figure standing, and holding in the left a cornucopiæ.

132 Obv. The same legend and type. Rev. Jovi Victori. Jupiter standing and holding in his right the thunderbolt.

134 .... nus. The same type. Rev. Pax Aeterna Aug. A figure holding in the right a palm branch.

134-6 Three coins of Gallienus.

*M. Aurelius Victorinus. (A. D. 268.)**Copper.*

137 Obv. Imp. C. Victorinus P. F. Aug. Bearded head of the Emperor with radiated crown. Rev. Untraceable Found near Patna. Donor — Rose, Esq.

138 Obv. The same. Rev. A figure standing.

139 Obv. The same. Rev. Undistinguishable.

140 Obv. The same. Rev. (Pietas)? Aug. A figure standing, as it appears, before an altar.

141 Obv. The same. Rev. A figure standing.

142 Obv. The same. Rev. Providentia Aug. Type of Providentia.

143 and 144 Obv. The same. Rev. A figure standing.

*P. Piverus Tetricus. (A. D. 268.)**Copper.*

145 Obv. Imp. Tetr | icus | .. Bearded head of the Emperor with radiated crown. Rev. Aug. A figure standing, and holding in the right a spear.

146 Obv. Imp. C. Te | tricus | the same type. Rev. Victoria (Aug.) Victory moving, in the left a palm, in the right a crown of laurels.

147 Obv. .. icus.

*L. Domitius Aurelianus. (A. D. 270—275.)**Copper.*

148 Obv. Imp. Aurelianus Aug. Head of the Emperor with radiated crown and part of the bust. Rev. Jovi Conser. Two figures, standing opposite each other.

149 Obv. The same Legend. Head of the Emperor with a crown of laurels. Rev. Concordia Aug. The Emperor, in his left a spear and giving his right to the empress.

*Probus. (A. D. 276—288.)*

## I. ROMAN COINS.

*Copper.*

150 Obv. Imp. C. Probus P. F. Aug. The head of the Emperor with radiated crown and bust, in his right holding the Roman eagle. R. Virtus Aug. 2. XX. T. A soldier standing, in his left shield and spear, in his right a Victory. A. D. 276. Med. p. 412.

151 Obv. Virtus Probi Aug. Head of the Emperor helmeted, in the right the spear, in the left the shield. Rev. Provident. Aug. S. XXI. C. A figure standing, in the right a globe, and in the left a transversal spear. A. D. 276.

152 Obv. The same Legend. Head of the Emperor with radiated crown and bust. Rev. Adventus August. The Emperor on horseback, his right raised, in his left holding the sceptre, a figure seated on the ground. A. D. 278. Med. p. 412.

153 Obv. The same Legend and Type. Rev. Fides milit. XXI. A figure standing, and holding in each hand a standard.



154 Obv. The same Legend and Type. Rev. Conservat Aug. T. XX. A naked Apollo with a glory round his head. The right hand raised, in the left a globe.

155 Obv. The same Type and Legend as No. 150. Rev. Virtus Augusti. A soldier holding in the left a spear, and touching the shield with the right.

156 Obv. The same. Rev. Pax. Aug. III.... XXI. A figure holding in the right a branch, in the left a spear in a transversal position.

157 Obv. The same. Rev. Soli Inviato C. M. XXI. S. Sol on his quadrigæ, surrounded by a glory.

## II. EGYPTIAN COINS.

### Copper.

158 Obv. ΚΜΑΥΠΗΡΟΒΟCΕΒ. Head of the Emperor. Rev. L B. anno 2: An eagle, bearing a laurel wreath. A. D. 277.

*M. Aurelius Carus. (A. D. 282—83.)*

## EGYPTIAN COINS

### Copper.

159 Obv. ΚΑΡΟΣ. Donor H. Torrens, Esq.

160 Obv. ΑΚΜΑΚΑΡΟCΕΒβ. Head of the Emperor with a crown of laurels. Rev. L A. A. D. 282. A female, holding in the right a scale, and in the left a cornucopiæ.

161 The same.

162 Obv. ΑΚΜΑ ΚΑΡΟΣ ΣΕΒ. Head of the Emperor with a crown of laurels. Rev. L B (anno 2) A. D. 283. Female, holding with the left hand her robe, and in the right a flower.

*Diocletianus. (A. D. 284—304.)*

## I. ROMAN COINS.

### Copper.

163 Obv. Imp. S. C. Val. Diocletianus. P. F. Aug. Head of the Emperor with radiated crown and bust. Rev. Jovi Conservat. S. XXX. T. Jupiter standing, in his left a spear, in his right a thunderbolt, and at his feet a boy. A. D. 284. Vid. Med. p. 224.

164 Obv. Imp. C. Val. Diocletianus. P. F. Aug. The same type as 163. Rev. The same Legend. Exerg. T. XXI. T. Type. Jupiter standing, in his left a spear, in his right the thunderbolt.

165 Obv. Imp. C. Val. Diocletianus Aug. Type as in No. 163. Rev. The same Type and Legend as in No. 115.

166 Obv. Legend and Type as in No. 163. Rev. Type and Legend as in No. 164.

167 Obv. Legend and Type as in No. 164. Rev. Legend and Type as in No. 163. Exerg. P. XXI. T.

168 Obv. Imp. C. C. Val. Diocletianus Aug. Type as usual. Rev. as in No. 163.

169 Obv. Imp. Diocletianus Aug. Head of the Emperor with radiated crown and

part of the bust. Rev. Jovi Conservat Aug. XXI. B. Type as in No. 163.

170 Duplicate of No. 169.

171 Obv. Legend and Type as in No. 161. Type as No. 160. Rev. Type and Legend as in No. 163. Exerg. S. XXI. T.

172 Obv. The Legend and Type as in No. 169. Rev. Legend and Type as in No. 169. Exerg. XXI. Δ

173 Duplicate of No. 172.

174 Duplicate No. 172.

175 Obv. Legend as in No. 163. Type as in No. 169. Rev. Jovi Conservatori XXI. T. Type as in No. 164.

176 Obv. Legend as No. 163. Rev. Leg. as in No. 163. Exerg. XXI. Δ. Type as in No. 164.

177 Duplicate of No. 176.

178 Duplicate of No. 176.

179 Obv. as No. 168. Rev. Legend and Type as No. 119. Exergue. XXI. t.

180 Duplicate of No. 179.

181 Duplicate of No. 179.

182 Duplicate of No. 179.

183 Obv. Legend as in No. 163. Type as in No. 166. Rev. Jovi Conserv. Aug. Jupiter standing, the spear in his left, the thunderbolt in his right, and the eagle at his feet E. XXΩIB.

184 Obv. Legend and Type as in No. 163. Rev. Jovi Conservat. III. XXI. T. Type as in No. 164.

185 Legend as in 172.

186 Obv. Legend as in No. 164. Rev. Herculi Conservat (P. XXI.) T. The naked Hercules standing, supporting his right on his hip, in his left the lion's skin and a club, leaning on a monument.

187 Obv. Imp. Diocletianus P. T. Aug. Head of the Emperor, with a crown of laurels and part of the bust. Rev. Salus Aug. et Caess. Fel. Part. A female figure standing, in her left a branch, in the right a bushel of ears.

## II. EGYPTIAN COINS.

### Copper.

188 Obv. .. ΔΙΟΚΛΗΤΙΑΝΟΣΣΕΒ. Head of the Emperor with a crown of laurels. Rev. A female with wreath and cornucopiæ L Γ (A 3) A. D. 286.

189 Obv. ΔΙΟΚΛΗΤΙΑΝΟΣ ΣΕΒ Rev. LH (a8.) Jupiter naked with a spear in the left, and the thunderbolt in the right. A. D. 292.

190 Obv. ΑΙΟΚΓΗΤΙΑΝΟΣ. Rev. LI (anno 10.) The eagle bearing a wreath. A. D. 294.

191 Obv. The same legend. Rev. A female helmeted; in the right hand a Victory, in the left a cornucopiæ. A shield on the ground LΔ (anno 4.) A. D. 287.

192 Obv. ΑΥΤ. ΟΥΑ ΔΙΟΚΛΗΤΙΑΝΟΣ ΣΕΒ. The same Legend. Rev. A Victory, holding in the right a wreath LΔ (anno 4.)

*Maximianus. (A. D. 286—304.)*

## I. ROMAN COINS.

*Copper.*

193 Obv. Imp. Maximianus Aug. P. T. Head of the Emperor with a crown of laurels and part of the bust. Rev. Genio Populi Romani A. G. S. A genius standing, with cornucopiæ and sacrificial vessel. A. D. 285. Med. p. 431.

194 Obv. C. Val. Maximianus Nob. C. Head of the Emperor with a crown of laurels. Rev. Legend and Type as No. 193. Exerg. αΘ.

195 Obv. Imp. C. Ma. Maximianus. P. F. Aug. Type as No. 193.

196 Obv. Maximianus Nob. Caes. Type as No. 194. Rev. Type and Legend as No. 193.

197 Obv. Maximianus Aug. Type as No. 193. Rev. Genio Augusti B. Genius standing with the usual attributes.

198 Obv. Imp. C. Val. Maximianus Aug. Head of the Emperor, with a crown of laurels and the bust. Rev. Gen. Pop. Rom. N. P. L. Q. A genius standing before a burning altar, in his right a sacrificial vessel, in his left a cornucopiæ.

199 Obv. Imp. Maximianus P. F. Aug. Head of the Emperor with radiated crown and part of the bust. Rev. Jovi Conservat Aug. XXI. Γ. Jupiter standing, in his left a spear, in his right the thunderbolt.

200 Duplicate of No. 199.

201 Duplicate of No. 199.

202 Duplicate of No. 199.

203 Obv. Legend and Type as No. 199. Rev. The same. No Exergue.

204 Obv. The same as No. 199. Rev. The same Legend and Type. Exr. XXI. Δ

205 Obv. As in No. 199. Rev. Legend and Type as in No. 199. Exerg. XXI. A.

206 Duplicate of No. 205.

207 As. 199. Rev. Jupiter, standing, the eagle on his feet, and holding with his right a Victory.

208 Duplicate of No. 207.

209 Obv. Imp. C. M Val. Maximianus Aug. Type as No. 199. Rev. Legend and type as in No. 199. Exerg. T. XXI. T.

210 Obv. Imp. C. M. Val. Maximianus Aug. Type as No. 199. Rev. Jovi Conservat. Aug. S. XXI. T. No. 199.

211 Obv. Imp. C. Ma. Val. Maximianus. P. F. Aug. Type as No. 199. Rev. Legend and Type as No. 199. Exerg. P. XXI. T.

212 As No. 199. Rev. Legend as in No. 199. Jupiter standing, the spear in the left, the eagle on his feet, and holding with his right a Victory.

213 Obv. Legend and Type as in No. 199. Rev. Virtus Augg. XXI. S. Hercules standing, and holding in his right the club, in his left some thing indistinguishable.

214 Obv. Imp. Maximianus P. Aug. Usual type. Pax. Aug. A figure standing, holding in its right a Victory on a globe, and in its left a transversal spear. A. D.

294 Med. p. 434.

215 Obv. Imp. Maximianus Aug. Rev. Pax. Aug. A figure standing.

216 Obv. Imp. (C. Va.) Maximianus P. F. Aug. The same Type. Rev. Concordia Militum. K. E. Two figures standing, holding in their right joined hands, a Victory standing on a globe.

## II. EGYPTIAN COINS.

*Copper.*

- 217 Obv. AKMA OYA MAΞ ΣΕΒ. Head of the Emperor, with wreath of laurels. Rev. ΛΑ anno 1. Female holding an olive branch and two cornucopiæ, a star on the left. A. D. 284.
- 218 Ohv. Head of the emperor (much effaced.) Legend illegible ΛΔ. (anno. 4.)
- 219 Ohv. MAΞ ΣΕΒ Rev. ΛΣ. An. 6. Rev. A winged female, holding a flower wreath in the right hand, and a palm branch in the left. A. D. 290.
- 220 Obv. AKMA OYA MAΞ ΣΕΒ. The same type. Rev. ΛΑ. A Victory, holding in the right hand a wreath of laurels.
- 221 Obv. ΝΟΣ ΣΕΒ. The same. Rev. Δ (anno 4, A. D. 287.) The same Type.
- 222 Obv. ΝΟΣ ΣΕΒ. The same Rev. ΛΔ (anno 4.) A. D. The same type.

*Constantius. (A. D. 306—337.)*

## ROMAN COINS.

*Copper.*

- 223 Obv. Constantius Aug. Head of the emperor, with a crown of pearls, and part of the bust. Rev. Β. | eata Tra | nquillitas. Aasket, within which Votis XX. Exerg. P. T. R. A. D. 325. Med. p. 466.
- 224 Obv. The same as 223. Rev. D. N. Constantinus. Max Aug. Exerg. A. P. Q. A wreath, in which is inscribed Vot. XX. A. D. 325.
- 225 Obv. The same Legend. Head of the Emperor, adorned with two strings of pearls. Rev. Providentiæ Aug. S. M. K. A. The Pretorian camp, with a star above it. A. D. 330. Vid Med. p. 467.
- 226 Obv. The same as 223. Rev. The same excepting the Exergue, which is wanting.
- 227 Ohv. The same as No. 223. Rev. Legend and Type as 225. Exerg.... T. S. T.
- 228 Ohv. The same Legend. Head of the Emperor with a crown of laurels and part of the bust. Rev. Soli Invicto Comiti. T. T. Exerg. P. T. R. Sol with a radiated glory, his right raised, in his left a globe.
- 229 Ohv. As in No. 228. The same Legend and Type. Inscription. S. C. Exergue. A. R. L.
- 230 Obv. As in No. 228. Rev. The same Legend and Type (effaced) Inscript (P. C.)
- 231 Ohv. Constantius P. F. Aug. Usual Type. Rev. The same Legend and Type. T. on the left inscribed into a small wreath. Exerg. S. P.
- 232 Obv. As in No. 228. Rev. The same Legend and Type. Exerg. S. T. R. Inscript. T. T.
- 233 Obv. The same. Rev. Legend. Inscript. and Type the same. Exerg. P. L. C.
- 234 Obv. The same, excepting the Exergue, which is Ω Ι Ω.
- 235 Obv. The same as No. 228. Rev. The same excepting that F. T. is written instead of T. F. written.

236 Obv. Constantinus P. F. Aug. Head of the Emperor, with a crown of laurels and part of the bust. Rev. Legend and Type as in No. 228. Inscript. S. P. Exerg. M. S. L.

237 Obv. Imp. Constantinus Aug. Type as in No. 225, (effaced.) Rev. effaced, but we may recognize the figure of Sol, as in No. 228.

238 Obv. Imp. Constantinus. Aug. The same type. Rev. Soli Invicto Comiti. P. L. C. The same type.—Donor H. Torrens, Esq.

239 Obv. Imp. Constantinus. Aug. Laureled head of the Emperor, with the bust. Rev. Type of Sol. Legend illegible.—Donor H. Torrens, Esq.

240-41 Obv. Imp. Constantinus Aug. Laureled head of the Emperor, with bust. Rev. Legend and Type as in 228. S. C. Exerg. L. N.

(All these Coins from 228—241 were struck A. D. 309. Med. p. 461.)

242 Obv. Constantinus Aug. Head of the Emperor, with a crown of laurels. Rev. Germania Devicta. C. Exerg. P. L. C. Victory moving, in her left a palm, in her right a trophy, and a prisoner at her feet.

243 Obv. Constantinus Max. Aug. Head of the Emperor, with a broad crown and part of the bust. Rev. Gloria exercitus. S. M. N. C. Two soldiers armed with helmet, spear and shield, watching before two military signs.

244 Duplicate of the preceding.

245 Obv. .... us P. F. Aug. The same type. Rev. Fel. Temp. Re | paratio | A soldier, the shield on his left arm, throwing down a horseman with his spear.

246 Obv. Imp. Const....us T. F. Aug. Head of the Emperor (effaced.) Rev. (Fel.) Temp. Reparatio. Exerg. S. M. T. S. The same Type as No. 245.

247 Obv. Anti.. Type as No. 245. Rev. As it appears, the same as No. 245. Donor H. Torrens, Esq.

248 D. Const.... Aug. Head of the Emperor, crowned with two strings of pearls, and part of the bust. Rev. The same Legend and Type as No. 245. Exerg. Rob. Inscript. Γ.

249 Much effaced, the same Type and Legend as No. 245.

250 Obv. As No. 245. Rev. Legend and Type the same. Exerg. S. M. H. B.

251 The same.

252-53 Two Coins of Constantinus.

254 Obv. Constantinopolis. A female figure helmeted, with a spear and part of the bust. Rev. Exerg. T. R. P. A Victory, with spear and shield, on a ship.

255 The same.

256 Obv. Urbs Romæ. A female head, adorned with the tunica palmeata and bearing a crested helmet, being a representation of the town Roma. Rev. Exerg. S. M. T. S. E Romulus and Remus with the she-wolf. Above two stars.

257 to 269 Thirteen bad Coins of the same type.

1 *M. Aurel. Val. Maxentius.* (A. D. 306—312.)

#### *Copper.*

270 Obv. Maxentius. P. F. G. Aug. Rev. Victoria Æterna Aug. Nost. A Victory standing. This coin, the type of which is much obliterated, appears to be the same which is mentioned by Med. p. 450, where Victory writes on a shield Vot. XX. A. D. 307.



*Flav. Julius Crispus. (Caesar. A. D. 316-326.)**Copper.*

271 Obv. | Cr. | ispus Nob. C.... Helmeted head with bust, part of the shield and spear. Rev. (Beata) Tranquillitas. Votis XX. inscribed in a basket, above which a globe with three stars. A. D. 326. V. Med. p. 473. Found at Patna—Donor — Rose, Esq.

*C. Val. Licinianus Licinius. (A. D. 306-324.)**Copper.*

272 Obv. Imp. Val Lic | inius | P. F. Aug. Head of the Emperor. Rev. Jovi.... ori. Of the Type the eagle only is discernible.

*Fl. Decentius. (Cæsar A. D. 350-358.)**Copper.*

273 Obv. Mag. Decentius Nob. Cæs. Head of the Emperor with part of the bust. Rev. Vict. D. D. N. N. Aug. et Cæs. Two Victories raising a shield, within which Vot. V. Mult. X. and beneath it a star, A. D. 352. Med. p. 485.—Donor H. Torrens, Esq.

*Constantinus Jun. (A. D. 337-361.)**Copper.*

274 Obv. Constantinus Jun. Nob. C. Head of the Emperor with a crown of laurels and the bust. Rev. Providentiæ Cæss. sunt. The Pretorian camp with a Star above it.

275 Obv. Constantinus Jun. Nob. C. Helmeted head of the Emperor with bust. Rev. Beat. Tranquillitas. Exerg. Plon. Inscript. T. B. A basket, in which Vot. XX. and above which a globe with three stars. A. D. 335.

*Constantius. (A. D. 337-351.)**Copper.*

276 Obv. Fl. Jul. Constantius Nob. C. Head of the Emperor with part of the bust. Rev. Gloria Exercitus. Exerg. S. M. N. D. Two soldiers with shield and spear, watching before two military signs.

277 The same, excepting the Exerg., which is M. A. L. D.

278 Obv. D. M. Constantinus, P. F Aug. Head of the Emperor with two strings of pearls, and part of the bust. Rev. Fel. Temp. Reparatio Sin. III. The Emperor, in a ship, holding in his right a globe, in his left a spear. Victory, above which a star, sitting on the helm.—Donor H. Torrens, Esq.

279 Obv. The same Legend. Head of the Emperor, crowned with laurels, with part of the bust. Rev. Gerio Populi Romani. B. A Genius standing before a burning altar.

280 Obv. Constantius Nob. Cæs. Head of the Emperor, with a crown of laurels, forming a circle round the middle of the head. Rev. The same legend and type as No. 277. Ex. L. P.

281 Obv. The same as No. 277. Rev. effaced.

282 Obv. Head of the Emperor, adorned with two strings of pearls. Rev. untraec-  
able. Found at Patna-Donor. — Rose, Esq.

283 .....tius Aug. Head of the Emperor, adorned with two strings of pearls. Rev.  
A figure standing, in the left a globe, and in the right apparently a trident.

284 to 289 Six Coins of Constantius.

*Fl. Theodosius Magnus.*

*Copper.*

290 to 92.... dosius P. F. Head of the Emperor. Rev. (Gloria) Romanorum. Three  
figures (Med. thinks them to represent the Emperor with his sons Arcadius and Hono-  
rius. V. Med. p. 519) standing and armed with spears. Found at Mahabalipuram,  
and formerly belonging to Col. Mackenzie's Cabinet. A. D. 393.

*Fl. Anicius Justinianus. (A. D. 527-65.)*

*Copper.*

293 Obv..... nus P. P. Aug. Head of the emperor with jewelled head-dress and  
bust, holding in the right a globe with star, on the left a star. Rev. A<sup>+</sup> A. D. 548.

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*Fl. Anicius Justinus Jun. (A. D. 565-78.)*

*Copper.*

294 Obv..... inus P. F. Aug. Head of the Emperor almost effaced. Rev. +

M

Con.

*Fl. Tiber Mauricius. (A. D. 582-62.)*

*Copper.*

295 Obv..... P. P. Aug. Face apparently of Mauritius, with jewelled head-dress  
and bust, hold in the right a globe and cross. Rev. A A. D. 585. V. Med p. 576.

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*Joh. Zimias.*

*Copper.*

296 Obv. Head apparently of Christ, almost obliterated. Rev. **XRISTO**  
**SBASIA**. Vid. Band. p. 738, where the full Inscription is given. **XPISTOS**  
**ΒΑΣΙΛΕΥΣ ΒΑΣΙΛΕΩΝ**. A. D. 970.

## ADDITIONS.

*C. Jul. Ver. Maximinus. (A. D. 235.)**Copper.*

297 Obv. Imp. Maximinus Pius Aug. Laureled head of the Emperor with part of the bust. Rev. Providentia, Aug. S. C. Type of Providentia; a globe at her feet.

298 The same Obverse. Rev. Fides Militum S. C. A figure holding in each hand a military sign.

299 Obv. Caesa. Trajanus Ha.... Head of the Emperor with radiated crown. Rev... r Pot. Cos. I. S. C. Exergue. ae. A figure seated, in the left a cornucopiæ.

300 Obv. Legend effaced. Head of the Emperor (Gallienus) with radiated crown. Rev. ...ollo Cos. A figure standing.

301 A Coin of Crispus.

302 to 313 Twelve Coins of Constantinus.

314 to 323 Ten Coins of Roman Emperors.

224 to 397 Seventy-three bad Roman Coins.

## B. CATALOGUE OF GRECIAN COINS.

1. *Coins of Greek Towns.*

1-2 Two Milesian coins, (copper.)

3 A silver tetradrachma. A lion moving with raised head. Double triangular symbol, surrounded by stars. Rev. Jupiter seated; legend illegible. Described by Mr. J. Prinsep, *Asiat Journ.* p. 31.

## 2. COINS OF GREEK KINGS.

1. *Macedonian of Kings.*

4 A silver drachma. Obv. Head of Hercules beardless, covered with the lion's skin. Rev. Jupiter seated, holding an eagle in the right, and a staff in the left; on the left side ΑΛΕ ΞΑΝΔΡΟΥ, below.. ΑΣΙΑΕ... Described by J. Prinsep, *Asiat Journ.* Vol. II. p. 31.

5 Another similar coin, semidrachma. Rev. ..ΞΑΝΔΡ.. on the field to the left M.

6 Another tetrachma of similar device. Legend illegible. *Asiat. Journ.* Vol. II., p. 31.

7 Another tetradrachma of similar device. Legend illegible.

2. *Syrian Kings.*

8 Silver drachma. Head of Demetrius with simple band. Rev. Jupiter seated on a solid altar, holding the thunderbolt. Down the sides ΒΑΣΙΛΕΩΣ ΔΗΜΗΤΡ-ΠΙΟΥ. Mr. Prinsep remarks (*Asiat. Journ.* Vol. II, p. 32,) with regard to this coin: This coin of Demetrius is recognised to be Seleucidan, from the figure of Apollo, sitting upon a peculiar altar, described by Pinkerton as a hamper inverted.

3. *Ægyptian Kings.*

9. A silver tetradrachm, brought from Egypt by Mr. Drew. Obv. Head of the King with curled hair, encircled by a diadem. Rev. Jupiter's eagle, standing on a thunderbolt. Leg. ΠΤΟΛΕΜΑΙΟΥ ΒΑΣΙΛΕΩΣ ΙΑΛΙΗ (anno 18.) Mr. Prinsep observes concerning this coin—A coin of Ptolemy I. or the V, B. C. 204. as Pinkerton says, his coins have most the letters ΠΑ or ΣΑ, explained to signify Paphos or Salamis, both cities of Cyprus.

10 Another. Same device ΛΗ Anno 8.

11 Another D. D. ΛΙΑ Anno 14.

12 Another D. D. ΛΙΕ Anno 15.

13 Another D. D. ΛΙΑ Anno 18.

14 A large copper coin. Head of the King with curled hair. Rev. An eagle..  
ΛΕΜΑΙΟ... ΒΑ.. Ε.

15 Another copper coin.

16 Copper coin of a King unknown.

## 4. INDO-GRECIAN KINGS.

a. *Eukratides.*

17 Obv. Square copper coin. Helmeted head of the King. Rev. The two Dioscuri, as it appears, charging. Owing to this type, which is that of Eukratides, and the head of the King, it has been appropriated to that prince.

b. *Menander.*

18 Silver tetradrachma. Obv. ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΜΕΝΑΝΔΡΟΥ. Head of the King with fillet and part of the bust, with the right hand throwing a thunderbolt. R. מוהאראגא טאדאסא (Moharajara Tadatasa Minadasa.) Minerva facing the right, in the left the Ægis, with the right throwing a spear. Monogram.

19. The same Obverse. Rev. The same type and monogram. Legend מנאנדר מלך.

20 The same.

21 The same Obverse. Rev. The same legend. Monogram. Minerva facing the left, the thunderbolt in the right, and the Ægis in the left.

22 The same legend and type. Rev. The same, excepting that the monogram is to the left of Minerva, instead of to the right. The same legend, well preserved.

23 The same legend. Helmeted head of the King. Rev. The same legend. Minerva facing the left with monogram on the left.

24 The same.

25 The same with exception of the monogram, which is as in 21.

26 Copper coin, totally effaced; visible only the letter ME.

c. *Hermes (?)*

27 Copper head of the King, much effaced. Legend not traceable.

28 Another similar one.

29 Head of the King effaced. Grecian and Cabulian legend illegible.

30 A Coin of an Indo-Grecian King.

*G. Coins of the successors of the Indo-Grecian Kings P. Barbaric Kings of  
Caulbul. Great King of Kings.*

COPPER.

1 Obv. not discernible. Rev. King on horseback to the right. Leg. ....

ΕΥΣΒΑΣ.

2-3 Two more.

4-5 Head of the King with a curly hair and flowing fillets. Rev. .... ΑΕ  
ΒΑCΙΑCΑC. .... A horseman mounted with flowing ribbands; before him a  
three-pronged symbol, the complete legend is Σωτηρμεγας βασιλεις  
βασιλεων Wils A. A. p. 333, remarks: The position of the first of the series, if  
there was a succession, or if the individual, if alone, is undoubtedly subsequent to the  
Greek Kings of Cabul. The title of great King of Kings connects him with Azes,  
and that he was posterior to Azes, is indicated by a peculiar symbol, a trident with  
three prongs.

6-9 Four coins more.

*2. Coins of the Indo-Scythian Kings of Caulbul.*

*Kadphises.*

COPPER.

10 Obv. King standing to the front with conical hat. Rev. effaced.

11 Another similar one.

12 Another of smaller size.

13-16 Four more.

17 Obv. Head of the King with Grecian legend illegible. Rev. Standing Hercules,  
Cabulian legend.

18-19. Two similar ones.

20 Cast of a gold coin. Figure of the King to the right with cap, the front of which  
projects to the right, and fillets, club in his right, carried in a car, drawn by two  
horses and driven by a minutive charioteer. ΒΑCΙΑΕΥΕ ΟΟ ΗΜΟ ΚΑΔ  
ΦΙCΗC. Rev. Naked figure to the front wearing a cap, the right hand rests  
on a trident.

21 Head of the King. In other respects the same with the preceding.

22 A similar one.

*Kanerkas.*

COPPER.

23 Obv. King standing to the right with coat, conical cap, and fillets, his right hand  
pointing downwards to an altar.

24-31 Eight coins of Kanerkas, much obliterated.

32 King standing before an altar. Rev. A figure with nimbus. Legend illegible.



33 King in Scythian dress, standing. Rev. Figure of an elephant.

34-37 Four similar coins.

38-41 Four coins more.

*Ooerki.*

GOLD.

42 Obv. Bust of the King with high cap to the left, a club in his right. PAO  
oo HPKI KOPANO. Rev. Standing figure to the left, halo and rays round  
the head, the right extended, the left holding the hilt of the sword. Mon. ΜΙΠΟ.

*Baraora.*

43 Obv. Cast of middle size. PAO NANO King standing to the left with curious cap and clad in mail; in the left holding a trident, the right pointing down to an altar, sword at the side. Leg. Rev. PAONAPAO. Figure of Shiva with hair hanging down both sides of the head; upper half of the body naked, the lower covered; behind him the bull, to the left a Monogram.

44-50 Seven more.

51 Obv. A figure of Kenorao seated cross-legged, with fillets and left hand raised. Rev. A figure standing. V. W. p. 368.

52-102 Fifty one Indo.-Scythian coins.

*D. Parthian or Arsakian Coins.*

103 A silver tetradrachma. Head of Arsaces (1.?) facing the right, with broad diadem and straight hair. R. Victory offering a crown to the King seated. Leg. ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΕΥΕΡΓΕΤΟΥ ΕΠΙΦΑΝΟΥ ΦΙΛ ΕΛΛΗΝΟΥ. Asiat. Jour. Vol. II. p. 34.

104 Obv. Silver tetradrachma. Head with mitred cap, and this ϣ symbol behind it. Rev. Figure seated, holding a bow. Leg. ΒΑΣΙΛΕΩΣ ΕΠΙΦΑΝΟΥΣ.

ΜΕΓΑΛΟΥ ΑΡΣΑΚΟΥ ΔΙΚΑΙΟΥ ΦΙΛΕΛΛΗΝΟΥ.

According to the shape of the Greek characters of this coin it must belong to one of the first Arsaces.

105 Head with mitred cap and aquiline nose, well executed. Rev. Figure seated, holding a bow, under which there is a kind of altar formed like the letter A. Leg. ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΕΥΕΡΤΕΤΟΥ ΔΙΚΑΙΟΥ ΕΠΙΦΑΝΟΥΣ ΦΙΛΕΛΛΗΝΟΥ. Character well delineated.

106 Another. Plain head dress; device and character very rude.

107 The same, but more legible.

108-9 Two similar ones.

110 Another, inscription legible, but in rude characters.

111 Another, Head of the King, to its right and left the moon and star. Rev. The same device, on the left of the figure this sign ϣ

112 Another, with entirely barbarous character.

113 Head of the King with aquiline nose and pointed beard. Rev. A figure in

trowsers, seated with bow. Leg. ΒΑΣΙ ΛΕΩΣ ΑΡΣΑΚΟΥ ΕΠΙΦΑΝΟΥΣ ΦΙΛΕΛΛΗ.

114 Obv. Head of the King with deep turban and mitred cap; bow behind, with fillets of the rudest fabrication. Rev. The same device. Character quite perverted.

*E. Sassanian Coins.*

115 Tetradrachm. Head of the King, with a cap or crown and curled hair. Rev. Sitting Hercules. Leg. in Cabulian character, 𐎧𐎡𐎧𐎡𐎧𐎡𐎧𐎡. Asiat. Journ. II, p. 312. Wilson A. A. p. 225.

116 Head of the King, facing the left, with a large tuft of curly hair and a peculiar cap; round it the legend in Cabulian characters almost obliterated. Rev. A fire altar (mithra) with the head of the King upon it, two priests on both sides with swords. Asiat. Journ. II, p. 36.

*F. Hindoo Coins.*

*Chandra Gupta series.*

117 A Gold Coin. Obv. Figure to the left standing, with a halo round the head, a bow in the left. Legend imperfectly legible. Rev. A female, sitting cross-legged, the left hand supported on her hip. Asiat. Journ. Vol. V. p. 648. Asiat. Res. Vol. XVII.

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*Librarian's Annual Report.*

*Abstract of the List of Books, received into the Library, from the 21st January to the 31st December, 1842.*

The number of all the Books, large and small, in different Languages, amounts to 253.

*English.*

Abstract of the Proceedings of a Committee for investigation of the Coal and Mineral Resources of India. Calcutta, 1842, (two copies.) 2 vols.

Address at the Anniversary Meeting of the Royal Geographical Society. London, 1841-1842. 2 pamphlets.

Annals and Magazine of Natural History, Nos. 47 to 59,—13 Nos. and Parts.

Annual Report of the Transactions of the Bombay Chamber of Commerce. 1840-41, 1 vol.

Ballantyne's Elements of Hindi and Braj-Bhaka Grammar. London, 1839, 1 vol.

——— Grammar of the Mahratta Language. London, 1839, 1 vol.

Baptist Missionary Magazine. Boston, No. 8.

Busawan Lal's Memoirs of the Puthan Sodier of Fortune. Calcutta, 1832, 1 vol.

Calcutta Christian Observer. New Series, 1842, vol. iii, 1 vol.

Calcutta Literary Gleaner, 1842, Nos. 1 to 8 and 10 (Nos. 4 two copies,) 10 Nos.

Calcutta Monthly Journal, 3rd Series, 1842. Nos. 83 and 84,—2 Nos.

Cantor's Zoological Sketch of Chusan. M. S. 1 vol.

Catalogue Gallery. London, 1840, vol. v.

Correspondence regarding the Discovery of the Tea Plant of Assam. Calcutta, 1841.

1 Pamphlet.

Cunningham's Map of the Comparative Geography of Central Asia, 1 No.

Darwin's Structure and Distribution of Coral Reefs. London, 1842, 1 vol.

Heynen's Tracts, Historical and Statistical, on India. London, 1814, 1 vol.

Ibraheem's Grammar of the Persian Language. London, 1841, 1 vol.

Irwin's Account of the General and Medical Topography of Ajmeer. Calcutta, 1841. 1 pamphlet.

Jameson's Edinburgh New Philosophical Journal, Nos. 62, and 64, two copies, and 65, 4 Nos.

Journal of the Bombay Branch of the Royal Asiatic Society. Nos. 2, 3.

Journal of the Royal Asiatic Society of Great Britain and Ireland. London, Vol. v. No. 10. four copies ; Vol. vi. No. 12. 5 Nos.

Journal of the Royal Geographical Society of London. Vol. x, Parts, 1, 2, 3 ; Vol. xi, Parts, 1, 2. 5 Nos.

Kerr's Sketch of Upper Assam. 1 vol.

Kittoe's Illustrations of Indian Architecture. 1 Vol., 4 Nos.

Lane's Dictionary, English and Burmese. Calcutta, 1841, 3 copies.

Lardner's Cabinet Cyclopædia—Natural Philosophy, Vol. i.

Laws and Regulations of the Egyptian Society. 1 pamphlet.

List of the Members of the Royal Asiatic Society of Great Britain and Ireland. 1841, 1 pamphlet.

London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science. 3rd Series, Vol. xix, Nos. 122 to 127 ; Vol. xx, Nos. 128 to 134 ; Vol. xxi. Nos. 135, 14 Nos.

Lyell's Principles of Geology. 6th Edition. London, 1840, 3 vols.

Mackenzie's (Col.) Plates, (13 pieces,)—13 Nos.

Macpherson's Report upon the Khonds of the districts of Ganjam and Cuttack. 1842, 2 copies.

McCosh's Medical Advice to the Indian Stranger. London, 1841, 1 vol.

Memoirs of the Royal Astronomical Society. London, 1840, Vol. xi.

Minutes of the Committee of Council on Education, 1840-41.—1 vol.

Moor's Notices of the Malayan Archipelago and adjacent Countries. Singapore, 1837, 1 vol.

Naturalist's Library—Entomology, Vol. vii., Foreign Moths. 1 vol.

————— Ichthyology, Vol. iii., Fishes of Guiana. 1 vol.

————— Mammalia, Vol. xi., Marsupials and Vol. xii. Horses, 2 vol.

————— Ornithology, Vol. xii. British Birds. 1 vol.

Newbold on the Ipoh or Upas Poison, used by the Jacoons and other Aboriginal Tribes of the Malay Peninsula. London, 1837, 1 pamphlet.

Pemberton's Report on Bootan. Calcutta, 1839, 1 vol.

Prinsep's Runjeet Singh. Calcutta, 1834, (defective,) 1 vol.

Proceedings of the American Philosophical Society. 1841, Vol. ii., No. 17.

- Proceedings of the Geological Society of London, 1841, Part ii. Nos. 76 to 83, 8 Nos.
- of the London Electrical Society. Session 1841-42. London, Parts i. and iv, 2 Nos.
- of the Royal Asiatic Society of Great Britain and Ireland. London, 1841, 1 Nos.
- of the Zoological Society of London, 1840, parts viii.—1 No. and parts.
- Reports of the British Association for the Advancement of Science. London, 1838, Vol. vii. and 1842, Vol. x, 2 vols.
- (Sixth) of the Egyptian Society. 1842, 1 pamphlet.
- on Projected Canals in the Delhi Territory, Allahabad. 1 vol.
- on the Settlement of the District of Seharunpore, compiled by E. Thornton, 1840, 2 vols.
- on the Training of Pauper Children, 1841, 1 vol.
- Roget's Explanation of an optical deception. London, 1835, 1 pamphlet.
- Royle on the Production of Isinglass along the Coast of India. London, 1842, two copies.
- Sabine's Narrative of an Expedition to the Polar Sea. London, 1840.—1 vol.
- Scott and Co's, Bengal Directory for 1842, 1 vol.
- Silurian System, from the Edinburgh Review. 1841, 1 pamphlet.
- Sketch in English and Khampti Characters, M. S. (a sheet,)
- Society for the Encouragement of Arts, &c. Premiums for 1840-41, 1841-42. London, 1840, (six copies,) 6 pamphlets.
- Sprenger's El-Mas'udis' Historical Encyclopædia. London, 1841, Vol. i. 1 vol.
- Spry's Plants, &c. required for India. Calcutta, 1841, 5 copies.
- Sykes's Fishes of the Dukhun, (pages 349 to 378,) 1 vol.
- Notes on the Religious, Moral and Political State of Antient India. London, 1841, 1 vol.
- Transactions of the Agricultural and Horticultural Society of India. Vol. viii., 1 vol.
- of the Geological Society of London, 1841, 2nd Series, Vol. vi. 1 vol.
- of the London Electrical Society from 1837 to 1840, London. 1841, 1 vol.
- of the Medical and Physical Society of Bombay, 1841, No. 4, 1 No.
- of the Royal Society of Edinburgh, 1841, Vol. xv., Part 1, 1 No.
- of the Society for the Encouragement of Arts, &c. Vol. liii. Part i., 1 No.
- of the Zoological Society of London, 1841. Vol. ii. part 5, 1 No.
- Trials of P. and M. Wallace. London, 1841, 1 vol.
- Wight's Icones Plantarum Indiæ Orientalis. Vol. ii. Part 3, 1 No.
- Wilson's Ariana Antiqua. London, 1841, 5 copies.
- Sanskrit Grammar. London, 1841, 2 copies.
- Translation of the Vishnu Purana. London, 1840, 1 vol.
- Wujra Soochi, or Refutation of the Arguments upon which the Brahmanical Institution of Caste is founded, translated by B. H. Hodgson, 1839, 1 pamphlet.
- Yarrell's History of British Birds. Vol. iii. Parts 26 to 30, 5 Nos.

*French.*

Actes de L'Academie Royale des Sciences, Belles Lettres et Arts de Bordeaux.  
1839, 1 vol.

Adam, L'Espagne Artistique et Monumental, planches lithographies. 1 vol.

Annuaire du Bureau de Longitudes. Paris, 1836, 1 vol.

Bulletin de la Société de Géographie. 3me Serie. Paris, tomes, xv et xvi. 2 vols.

Catalogue de la Librairie D'Ab. Cherbuliez et Cie. à Paris et à Genève, 1 pamphlet.

Cuvier, Histoire Naturelle de Poissons. Paris, 1842, Tome, xvi, 1 vol.

Desjardins, Observations Meteorologiques faites a flacq. (a sheet.)

Foucaux, specimen du Gya-tcher-rol-pa, Partie du Cbapitre vii. contenant la  
naissance de Cakya-Muni. Paris, 1841, 1 pamphlet.

Journal Asiatique, 3me Serie. Paris tome x, Nos. 56 a 58, tome xi, Nos. 59 à 64,  
tome xii, Nos. 65 à 69, tome xiii, Nos. 70, 71, 72, 16 Nos.

Journal des Savants. Paris, 1841, Mai à Decembre, et 1842, Janvier à Juin, 14 Nos.

Macaire et Auguste, Experiences pour servir a l'histoire de l'Acide Muriatique.  
Genève, 1824, 1 vol.

Macarie-Prinsep, Memoire sur l'influence des Poisons. Geneve, 1825, 2 pamphlets.

Marcel, Contes Arabes du Cheykh El-Mohdy. Paris, 1833, 6e, 7e, 12e Livraisons,  
3 Nos.

—— de l'Action des Poisons sur le Regne Vegetal. Geneve, 1825, 1 pamphlet.

Mémoire de la Société de Physique et d'Histoire Naturelle de Geneve. Tome viii,  
1ere et 2me parties, (two copies each,) tome ix, 1re partie, 5 Nos.

Programme de la Société Royale D'Agriculture et de Commerce de Caen. 1 pam-  
phlet.

Reponse de M. de Paraveyà l'Article de M. Riamburgh sur l'Antiquités Chinoises.  
Paris, 1836, 1 pamphlet.

Voyage Autour du Monde par les Mers de L'Inde et de Chine de M. Laplace. Pa-  
ris, 1839, tome v, 1 vol.

*Latin.*

Callery, Systema Phoneticum Scripturæ Sinicæ. pars 1a and 2da, 2 Nos.

Hesychii Glossographi Discipulus. Edidit B. Kopitar. Vindobonæ, 1840, 1 pamphlet.

Glossarium Archæologicum. Authore H. Spelmanno. London, 1687, 1 vol.

*German.*

Bopp, über die Verwandtschaft der Malayisch Polynessischen, Sprachen, &c. Berlin,  
1841, 1 vol-

Geschichte der Ilchane, dast ist, der Mongolen in Persien, Von Hammer. Easter-  
Band, 1 vol.

Hammer, Gamachscharis Goldene Halsbänder. Wien, 1835, 1 pamphlet.

Jahrbücher der Literatur, Nos. 93 to 96, 4 Nos.

Lassen, Zeitschrift für die Kunde des Morgenlandes, iv. Bd. i. Heft, 1 No.

*Dutch.*

Vosmaer's Baai of Kendari, Trigonometrisch Opgenomen. Outdekt, 1831 (Map),  
1 No.



*Italian.*

Di un Vaso Greco Dipinto che si Conserva nel real Museo Porbonico Discorso del Cavalier Bernardo Quaranta, 1 pamphlet.

Sula Figura et L'Iscrizione egizia in cise in uno smeraldo Quaranta. Napoli, 1826, 1 pamphlet.

*Arabic.*

Diwani Mootanubee. Hooghly, 1841, 1 vol.

Aafhatul Yaman Hooghly, 1841, 1 vol.

Merrat-ul-Janaun, Maroof Tarikh-ia-phai, 1 vol.

*Persian.*

Tarikh Ferishta, 2 vols.

*Hindee.*

Naphasil, Lagawd, 1 vol.

Masnabee, Kanoor, 1 vol.

Raja Bolee, written in Bengalee Characters (Potec,) 1 vol.

*Sanscrit.*

Sahitya Derpana, 1828, 2 copies, Potee.

*Burmese.*

The Holy Bible, containing the Old and New Testament, 2d Edition. Moulmain, 1840, 1 vol.

*Amount of Books in each Language.*

English,	-	-	-	-	-	-	179
French,	-	-	-	-	-	-	54
Latin,	-	-	-	-	-	-	4
German,	-	-	-	-	-	-	8
Dutch,	-	-	-	-	-	-	1
Italian,	-	-	-	-	-	-	2
Arabic,	-	-	-	-	-	-	3
Persian,	-	-	-	-	-	-	2
Hindee,	-	-	-	-	-	-	3
Sanscrit,	-	-	-	-	-	-	2
Burmese,	-	-	-	-	-	-	1

Total, - - - 259

*Oriental Publications, &c. sold from the 10th January up to the 27th December, 1842.*

Mahabharata, Vol. i. 8 copies; ii. 7 do.; iii. 9 do.; iv. 9 do.	..	Rs.	330	0	0
Index to do. Vol. i. 4 copies; ii. 3 do. iii. 3 do. iv. 3 do.	..	..	19	8	0
Raja Taringini. one copy.	.. .. .	..	5	0	0
Naishada, one copy.	.. .. .	..	6	0	0
Sausruta, Vol. 1 and 2, one copy each.	.. .. .	..	8	0	0
Fatawé Alemgiri, Vol. i. 2 copies; ii. 1 copy; iii. 7 copies; iv. 10 do. v. 7 do.; vi. 7 do.	.. .. .	..	279	0	0
Anis ul Musharrahin, one copy.	.. .. .	..	5	0	0
Jawame ul Ilm ul Riazi, one copy.	.. .. .	..	4	0	0
Persian Catalogue, one copy.	.. .. .	..	1	0	0
Asiatic Researches, Vols. xiii. to xx. and Index	.. .. .	..	80	0	0
Journal of the Asiatic Society, Vols. ix, x. and 11 Nos.	.. .. .	..	70	0	0
Sharaya ul Islam, 4 copies.	.. .. .	..	32	0	0

Total Rupees .... 839 8 0

## ABSTRACT.

*Account of the Oriental Publications, delivered, sold, and in store, from May 1838 to the 31st December, 1842.*

*Mahabharata.*

	Vols.	1	2	3	4
Found and Received, .....	Copies	289	304	330	477
Delivered and Sold, .....	„	35	35	36	158
Balance, ....	„	254	269	294	319

*Index to Mahabharat.*

	Vols.	1	2	3	4
Found and Received, .....	Copies	489	491	498	493
Delivered and Sold, .....	„	32	31	32	108
Balance, ....	„	457	460	466	385

*Harriwansa.*

Found and Received, ....	....	....	....	....	Copies	491
Sold, ....	....	....	....	....	„	5
Balance, ....	....	....	„	....		489

*Raja Taringini.*

Found and Received, ....	....	....	....	....	Copies,	309
Delivered and Sold, ....	....	....	....	....	„	23
Balance, ....	....	....	„	....		286

*Naishada.*

Found and Received, ....	....	....	....	....	Copies	244
Delivered and Sold, ....	....	....	....	....	„	25
Balance, ....	....	....	„	....		219

*Sausruta.*

	Vols.	1	2
Found and Received, ....	Copies	287	334
Delivered and Sold, ....	„	26	27
Balance, ....	„	261	307

*Sanscrit Catalogue.*

Found in the Library, ....	....	....	....	....	Copies	271
Delivered and Sold, ....	....	....	....	....	„	16
Balance, ....	....	„	....	....		255

*Fatawe Alemgiri.*

			Vols.	1	2	3	4	5	6
Found and Received, ....	....	Copies	141	101	35	109	155	165	
Delivered and Sold, ....	....	„	54	4	16	25	27	28	
Balance, ....	....	„	87	97	19	84	128	137	

*Innaya.*

			Vols.	1	2	3	4	
Found and Received, ....	....	....	Copies	0	38	31	33	
Delivered, ....	....	....	„	0	2	2	2	
Balance, ....	....	....	„	0	36	29	31	

*Khazanath-ool-Ilm.*

Found and Received, ....	....	....	....	....	Copies	147
Delivered and Sold, ....	....	....	....	....	„	54
Balance, ....	....	....	„	93		

*Jawame ul Ilm ul Riazi.*

Found and Received, ....	....	....	....	....	Copies	435
Delivered and Sold, ....	....	....	....	....	„	41
Balance, ....	....	....	„	394		

*Anis ul Musharrahin.*

Found and Received, ....	....	....	....	....	Copies	365
Delivered and Sold, ....	....	....	....	....	„	48
Balance, ....	....	....	„	317		

*Sharaya-ool-Islam.*

Found in the Library, ....	....	....	....	....	Copies	500
Delivered and Sold, ....	....	....	....	....	„	165
Balance, ....	....	....	„	335		

*Persian Catalogue.*

Found in the Library, ....	....	....	....	....	Copies	262
Delivered and Sold, ....	....	....	....	....	„	24
Balance, ....	....	....	„	238		

*Asiatic Researches.*

	Vols.	3	7	8	9	11	12	13	14	15	16	17	18	18	18	19	19	19	20	20	20
Found & Received,	4	1	3	2	1	10	45	61	70	118	229	91	163	54	150	40	233	246	30	260	112
Delivered & Sold,	1	0	0	0	0	5	14	14	14	20	16	22	12	8	22	14	137	11	18	131	15
Balance,	3	1	3	2	1	5	31	47	56	98	213	69	151	46	128	26	96	235	12	129	141

*Tibetan Grammar.*

Found and Received, ....	....	....	....	....	Copies	211
Delivered, ....	....	....	....	....	„	3
Balance, ....						208

*Tibetan Dictionary.*

Found and Received, ....	....	....	....	....	Copies	208
Delivered, ....	....	....	....	....	„	3
Balance, ....						205

Read Report of Curator Museum Economic Geology as follows :—

*Report of the Curator Museum of Economic Geology for January, 1843.*

MUSEUM ECONOMIC GEOLOGY.—We have received during this month, through Major Fitzgerald, Superintending Engineer S. E. Provinces, from Mr. Bahington, Executive Officer on the Raepore Mail Road, a capital series of ores and mining products from the Kuttarhugga iron mine, 20 miles N. E. of Sumbulpore.

This collection is the most complete we have yet received, for it comprises every thing, from the crude ore to the finished product, which is noted by me as desirable in our circular, including a capital earthen model of the furnace, to scale, the tools, &c.

The ore itself is a peculiar one, being at first sight a common brown clay iron ore, but it is seen on closer inspection to be mixed with minute crystallised grains of the black hematite. It is not magnetic.

No. 2555.

To H. PIDDINGTON, Esq.

*Curator to the Museum Economic Geology, Calcutta.*

*Midnapore, 7th January, 1843.*

SIR,—Under instructions from the Military Board, No. 5498, dated 3rd instant, I have the pleasure to forward to you the accompanying Statement and a box, containing specimens of mining products, received from Mr. Bahington, Executive Officer on the Raepore Mail Road.

I have the honor to be, Sir,

Your obedient servant,

W. R. FITZGERALD, Major,

*Superintending Engineer S. E. Provinces.*

---

*Mining Products, from the Kutterbagga Iron Mine, 20 miles North East of Sumbulpore.*

1. Specimen of the crude ore, just as found.
  1. A Ditto of rock, or matrix in which found.
  1. B Ditto of earth between the veins.
  1. C Ditto of an inferior ore lying between the veins.
2. The ore after preparation for the furnace.
3. The ore does not contain gravel or stones.
4. No description of fluxes are used.

5. Charcoal used in smelting, made from saul, specimen marked O and from jam, marked X, the English name of the latter wood not known.\*

6. The roasted or half smelted ore.

7. The pure metals, as obtained in a merchantable state, in all the qualities, marked D, E and F.

8. Slags of kinds, marked G and H.

9. Earthen model of furnace, and pipe in which bellows are inserted, together with a pair of bellows. The size of the furnace used by the Miners is three feet and six inches deep, by two feet and eight inches wide.

10. Specimens of tools: one large hammer, one small hammer, one pair of pincers; no anvils are used, the iron being beaten out on a large piece of granite.

The mine is situated twenty miles North East of Sumbulpore; there are no traditions as to when it was first discovered, but the Miners say that their families have worked it for ten generations. The gross produce at present is said to be, one thousand maunds Calcutta weight, per annum. Capital and skill are only required to produce an unlimited quantity, as the ore is abundant, and the forests inexhaustible. There is a tax of one rupee and four annas per annum levied on each furnace, paid by the Miners, who all work on their own account, so that it is difficult to form any estimate of their profits as they are cultivators of the soil, and carry on their smelting, when not otherwise engaged. The specimens of iron marked D and E, are sold on the spot for one rupee and two annas per bazar maund, and that marked F, at about eight annas per maund. The health of the Miners does not seem to be affected by their work; they all look well, and many of them attain to the age of seventy or eighty years; they are not subject to any peculiar diseases. With the exception of the cow and buffaloe, they eat almost every description of animal, and drink the mowah spirits to excess; this is their great failing, in all other respects they are not less moral than the other villagers. They do not appear to have any superstitions peculiar to themselves. When a new furnace is erected, and on opening the mine at the commencement of the season, a goat is sacrificed to Gauttailee, the goddess of the mine.

C. L. BABINGTON,

*Sumbulpore, 14th December, 1842.*

*Executive Officer, Raepore Road.*

By the permission of the Honourable the President, I have applied to the Government for a set of the Maps of the Atlas of the Grand Trigonometrical Survey for the use of the Museum, and these have been liberally accorded to us; they are now on the Table.

From Captain Goodwyn, B. E. we have received a great addition to our collection in a specimen of the native Asphaltum of Seysell, which is the origin of all the bituminous compounds used under the name of asphalt for road-making and other purposes in Europe. Captain G. informs me, that he has brought out with him about a ton of the prepared Asphaltum for trial in the flooring of rooms. It may be worth noticing here, that the whole lower floor of the Society's House, which was laid in 1839, by Colonel Macleod, with the common mixture of pitch, tar, lime and

\* Most probably *Engenia Yamboz*.—H. P.



sand, continues perfectly dry, and even dusty, in the rains, though before it was, with the common pukka floor, most destructively damp. No traces of damp are any where to be seen now.

GEOLOGICAL AND MINERALOGICAL.—We have obtained from the native contractor the two new mineral cases, though, as usual with them, with defects which require to be amended. When I can use them I hope to get on again, and finally, with our mineral arrangements, which now for want of room, it would be almost useless, and next to impossible to do.

We have to acknowledge here from Mr. W. H. Batten, who is most indefatigable in his labours to assist us, the last portion of that part of Captain Herbert's Journal edited by him. He has also kindly offered to give us a memorandum of (unavoidable) Errata in the Extra Number of the Journal, containing Captain Herbert's Reports, and to remark upon a few of his oversights. We have duly received the volume alluded to in his letter, and at my first leisure, I propose looking out the specimens to this part of the Journal.

From our liberal contributor Dr. Spilshury, and through the kind assistance of Ensign Hickey, 1st Native Regiment, we have to announce the arrival of a magnificent fossil elephant's skull, of which until the matrix is cleared off, we can only say that it is Elephantine; that its width across the temples is about 36 inches; that of our largest recent elephant's skull being only 30.

The Society is specially obliged to Ensign Hickey, for his attention to this precious relic. He found it in the compound of a bungalow at Kamptee, and learning its history, most kindly brought it down to Barrackpore for us.

We have received from Government advice, that the box of minerals alluded to in my last is shipped on the *Prince of Wales*. H. PIDDINGTON.

1st February, 1843.

The business of the evening having terminated, the Honorable the President then rose, and with much feeling addressed the Members. He stated that it was now upwards of thirty years since he first joined the Society, then under the presidency of Mr. Henry Colehrooke. He was then a young Member of the Civil Service, and little dreamed that he should one day have the honour of filling a chair in which so many illustrious men had sat in succession. He would not advert to the history of the Society in this long period, during which he had been too severely tasked by public duty to do much which he had desired to do, and which, as a well wisher to the interests and objects of this Society he ought to have done, and much which he should have felt pride and pleasure in doing; but it was now his painful duty to state that he had placed in the hands of the Acting Secretary his formal resignation of the Presidentship; which would be duly brought forward at the next meeting by the Committee of Papers.

After so long a connection with the Society, from which he had, he felt, received far higher honours than he had deserved, he could only now, in bidding it farewell, assure every member of it of his continued interest in its labours, of his hearty wishes for its increasing prosperity, and of his sincere desire to forward its interests in every possible way.

Read a memorandum from the Zoological Curator (who from illness had been unable to prepare his report) on some new Monkeys, Birds, &c. on the table.

SIR,—I have to acknowledge the following presentations to the Museum:—

From Captain R. Wroughton, as announced by letter in XI, 879,

A skin of a female Gaour (*Bos Gaurus*), in very good condition;

One of *Crocodilus biporcatus*; and

A large arboreal Wasp's nest.

From J. C. Jerdon, Esq.

A box of various Fossils, from the Neilgherries, a list of which may shortly be expected.

From Mr. Ridsdale, of Bishop's College,

A skin of a Prion Petrel (*Pachyptila Frosteri*).

Three species of Snakes, from Ceylon.

An *Echeneis remora*.

From Mr. DeCruz, of the Botanic Garden,

A most formidable species of true Viper, which I have been unable to find a name for, and wait in this and other instances for the publication of that part of MM. Dumeril and Bibron's valuable '*Histoire des Reptiles*', which treats of the *Ophidia*, before venturing to impose a name upon any species belonging to the order.

A fine *Varanus binotatus*, and some insects.

From Major Ouseley,

A specimen of *Saturnia Assamica*, from Chota Nagpore.

From our Honorary Secretary, Mr. Torrens,

A Rose-crested Cockatoo (*Ptilinopus rosaceus*.)

Among the numerous specimens obtained in the neighbourhood or purchased, I shall only notice two species of birds; viz.

*Hyptiopus* (Hodgson, olim *Baza*, H.,) *lophotes*; *Falco lophotes*, Tem. A beautiful pair, male and female, procured alive, and which had the power of erecting their crest quite vertically, as I doubt not is also the case with the various other Hawks similarly crested: and

*Vinago? cantillans*, Nobis. Male thirteen inches long, by twenty-one inches in alar expanse; wings seven inches; and tail five inches and a half, its form cuneated: bill to frontal feathers seven-eighths of an inch; and tarse three-quarters of an inch. Predominant hue a delicate pearl-grey, conspicuously tinged with ruddy on the crown and breast: fore-part of the wings maroon-red, which also deeply tinges the scapularies and interscapularies: belly faintly tinged with yellowish-green, and a trace of dingy green margining the rump plumage and the smallest tertiaries, also prevailing on the coverts of the secondaries, the greater series of which are slightly bordered with whitish-yellow: primaries and secondaries dusky, together with the extremities of the outer tail-feathers: vent white, the feathers of its sides having dark ashy centres; and lower tail-coverts whitish-buff, being more or less ashy at base. Irides as usual in this genus, or having a crimson ring encircling a violet one: bill and bare skin around the eye glaucous-blue; and legs and toes reddish carmine. This remarkable species is essentially a *Vinago*, though differing considerably from the typical species in the form of its bill and feet; insomuch that it might, with propriety, be elevated to

the rank of a particular subgenus: the former is comparatively slender and elongated, having the basal three-fifths membranous and tumid, and the corneous extremity feeble; and the toes also are slender, and not broadened underneath. The specimen described was purchased alive, and was said to have been brought from Agra; but some *shikarees* to whom I shewed it decidedly recognised the species, at once remarking on the peculiarity of its note, and said that it is procurable in the Soonderbuns. Its *coo* is extremely remarkable, bearing no slight resemblance to the human voice in singing, and highly musical in tone; it is considerably prolonged in different cadences, and terminates very abruptly; but every time it is repeated exactly as before, so that it becomes wearisome, at least to an European ear\*. This bird was sold to me as the *Kokla* Pigeon of the Upper Provinces, great numbers of which are kept in cages by the natives, for the sake of their music; but enquiry has led me to ascertain that *V. sphenura* is the true *Kokla* of the Upper Provinces, whereas in Bengal this term is applied to *V. bicincta*, Jerdon, both of these species differing from the common Hurrial (*V. militaris*) by having coral-red legs instead of gamboge-yellow ones, which is generally mentioned as the distinctive feature of the *Kokla*; the *V. bicincta*, however, has a less musical, or at least less varied, note than the Hurrial. The *coo* of the latter, if such it can be called, consists of a melodious deep toned whistling note, varied by a guttural sound; and those who are unacquainted with it would be apt to mistake it for the note of a true singing bird: that of *V. bicincta* is equally melodious, but less prolonged as well as less varied. I know of only the two last-named species of this genus in the vicinity of Calcutta.†

With much respect, I remain, Sir,

Yours obediently,

EDWARD BLYTH.

*P.S.*—As the foregoing Report is very brief, I shall take this opportunity to revise my previous Reports to the Society, commencing with Vol. X, p. 836.

Page 837. *Orang-utans*. Important information on these animals has been communicated by Mr. James Brooke, respecting those of Borneo, in a letter to the Curator of the Zoological Society, published in the 'Proceedings' of that body for July 13th, 1841. That gentleman has satisfactorily confirmed the deductions of Mr. Owen from certain crania, to the effect that at least two, and there is every reason to suppose three, distinct species exist, all of which inhabit the island of Borneo.

One, the *Mias Kassar*, or *Pithecus Morio* of Owen, is distinguished by its inferior size, by the non-gigantic proportions of its extremities, by the absence of callosities on the cheeks at all ages and in both sexes, by the small size of its teeth, and especially by having no elevated ridge whatever extending backward beyond the frontal bones of the skull. The nearly perfect skeleton of a female Orang in the Society's Museum appertains to this species.

\* It scarcely differs, if at all, from the note of *V. sphenura*, which I have since heard.

† In a letter just received from Mr. Jerdon, that naturalist enquires whether I have ever obtained the grey-bellied *Vinago*, figured as *militaris* by Gould? Certainly, Gould's species is the common Hurrial of Bengal; but I have also obtained one female which I now think is distinct, being probably the *V. militaris* apud Jerdon. This bird has the whole under-parts bright green, but not any of this colour on the basal part of its caudal *rectrices*, and there is also scarcely a trace of red on its lower tail-coverts. Size rather inferior to that of the other. It may bear the specific name of *chlorigaster*.

Another, the huge animal with immense cheek-callosities and gigantic extremities, has the ridges of the skull less elevated than in the next kind, "but the size of the adult skulls is equal;" in this "the ridges rising from the frontal bones do not meet, but converge towards the top of the head, and again diverge towards the posterior portion of the skull." Unfortunately, we have not the cranium of Dr. Abel's Sumatran specimen, the skin of which, as I stated in my former Report, *possesses cheek-callosities* of moderate size; but the skin of the head is mutilated so that it cannot be ascertained whether the frontal ridges meet or not on the vertex, although they are strongly marked on the skin so far as this is perfect. The whole top of the head from the forehead has, in fact, been cut away; and all that we possess of the osteology of this specimen is the lower jaw, which presents a very decided difference of form from the lower jaws of both the others. There appears to be no reason, however, for doubting that this Sumatran animal is perfectly identical with the Bornean *Mias Pappan* of Brooke, or *Pithecus Wurmbii* of Owen; and accordingly the *Pithecus Abelii* (verus) must be reduced to a synonym.

In a third form of skull, "the two ridges, one rising from each frontal bone, join on the top of the head, forming an elevated crest, which runs backward to the cerebrial portion of the skull." This Mr. Brooke presumes to be the *Mias Rambii*, a third species distinguished by some of the natives of Borneo, and stated by them "to be as tall as the *Pappan*, or even taller, but not so stout, with longer hair, a smaller face, and no callosities either on the male or female; and they always insisted that it was not the female of the *Pappan*," which is asserted by them to have cheek-callosities, the same as the male. The probability of this being a distinct species is further strengthened by a large adult living female shipped by Mr. Brooke for England; "her colour is dark brown, with black face and hands; and in colour of hair, *contour* and expression, she differs from the male Orangs, with the callosities, to a degree that makes me doubt," writes Mr. Brooke, "her being the female of the same species." A skull of a Bornean specimen according with this description exists in our Museum, being clearly identical in kind with that (also from Borneo) figured in the Zoological Society's 'Transactions,' II, plates XXXI and XXXII; but it is evidently that of a female from its smaller size, the inferior development of the ridges, and the size of the canines.

In the first Volume of the same work, Professor Owen has described and given two figures of an *alleged* Sumatran Orang's skull, which differs again in certain particulars from the large Bornean specimen figured by him as adverted to. The profile of the face, if I remember rightly, is much more concave; but our library is unfortunately deficient in that *part* of the volume, and I have been unable to get it elsewhere in Calcutta. However, in describing the Bornean specimen, Mr. Owen writes (in Vol. II, p. 168), that — "The osteological differences relating to the structure and contour of the cranium, [in the Bornean and presumed Sumatran specimens,] have been described in my previous communication on the subject, and I now subjoin figures, of the natural size, of the cranium of an adult male, undoubtedly from Borneo (pl. XXXI and XXXII), a comparison of which with the figure of the (said to be Sumatran) Orang's skull (pl. LIV and LIV, Vol. I, *Trans. Zool. Soc.*), will convey an adequate idea of the osteological difference alluded to." Both have the ridges



united along the vertex, as in the last described form mentioned by Mr. Brooke, so that a fourth species of Orang may yet remain to be discovered.

According to M. Isidore St. Hilaire, in the *Zoologie du Voyage de M. Bélanger*, p. 25, Orangs are found in Cochinchina, and the Malay peninsula, as well as in Borneo. He does not mention Sumatra, though quoting Clarke Abel's account, and was unaware of the existence of a plurality of species.

There is now living in Calcutta a young male Orang having incipient cheek-callosities, which consist of merely a thickened fold of skin, which would certainly not be observed unless attention were especially directed to the subject. He has as yet cut none of his *true* molars, and measures sixteen inches from shoulder to ham, and twenty inches from shoulder to tip of longest finger. His gait is decidedly not that of the *Kassar*, as described by Mr. Brooke, nor does that gentleman's account of that of the *Pappan* well apply to it; this animal going on all fours, and (what of course must be considered an individual peculiarity,) I observe that he invariably walks with one fist closed, bearing however on the wrist, and the other having only the fingers doubled; both hands being turned outward. So far as can be judged from so young an animal, I am inclined to think that the ridges arising from his frontal bones *will meet*; but I would not lay much stress upon this observation: and the only further remark that I need at present make concerning him, is that his posterior thumbs are nail-less, as is most usual.

Page 838. *Gibbons*. *Hylobates leucogenys*, Ogilby. With reference to my incidental remarks on the habitat of this species, Mr. Jerdon writes me word — "You may rely upon it no real Ape exists in Southern India." Lieut. Beagin's statements were, nevertheless, positive; and he could not well have confounded it with *Semnopithecus Johnii*, as he also favoured me with information concerning that species (vide *Proc. Zool. Soc.*, 1841, p. 60). An undetermined species of Gibbon inhabits Celebes.

Page 839. *Indian Semnotes*. Only two species of the extensive Austral-Asian genus *Semnopithecus* are recognised as inhabitants of Continental India in the most recent work of authority treating on the subject, which is Mr. Martin's 'Natural History of the Mammalia,' unfortunately discontinued (from the failure of the publishers, in 1840,) after the ninth number, which contains an account of the group under consideration. The two species adverted to are:— *S. Entellus*, the common *Hoonuman* of Bengal, understood to be very generally diffused, and not only in the low country, but occasionally ascending even to the verge of the snow-line upon the Himalaya, — and *S. Johnii* (Fischer, vel *cucullatus* of Is. Geoffroy and Lesson), which is confined to the southern parts of the country, "abounding," as Mr. Jerdon informs me, "in the dense woods of the Neilgherries, and in the forest on the sides of the hills. I have also seen it," he adds, "in the elevated district of the Wynaad, but only near the base of the Neilgherries. It associates as usual in small herds; leaps with amazing agility, and has a loud call very like that of the *Entellus*. The young are perfectly black, with hardly an indication of the light-coloured hair of the hood of the adult. It is more suspicious and wary than the *Entellus*, and never leaves the woods."

The *S. cephalopterus* (vel *latibaratus*, *leucoprymnos*, *salvogriseus*, et *Nestor*, Auctorum,) is, however, described as peculiar (so far as known) to Ceylon; and in the description of *S. Johnii*, Mr. Martin observes that — "In the Paris Museum a



specimen exists, which is here referred, though with some degree of doubt, to the *S. Johnii*; as it differs considerably in the general tone of its colouring, from any of the examples of this species hitherto examined. It is an aged female from Malabar, and is accompanied by its nursling, considered to be her own offspring." The following description is annexed: — "Length of head and body two feet; of tail three feet two inches. The fur resembles that of an adult *Entellus*: the hack is of a fuliginous-grey, becoming darker on the shoulders and thighs, and still more so on the arms and legs, where the colour is nearly black; the hands and feet being quite black: the head, whiskers, and beard, which latter is conspicuous, are of a dirty straw-yellow, passing insensibly into the hue of the back; the long eye-brows, and hairs continued from them over the sides of the cheeks, are black, as are also those scattered on the upper lip; the face is black; the tail dark brown, its apical third being much paler; the inside of the humerus, and of the thighs and the under surface of the body, are of a dusky straw-colour. The nursling is covered with close, soft, soot-coloured hairs."

This description closely applies to the fully adult male which I named *S. hypoleucos* in my first Report to the Society, except that the size is larger, and the tail of the Society's specimen is wholly black\*: the dirty-whitish hue of the crown, also, is distinctly enough separated from the peculiar colour of the back, which Mr. Martin styles a fuliginous-grey, while in my description I have termed it "a rather deep and somewhat dusky brown, with a tinge of chocolate"; but the truth is, it is by no means an easy tint to express in words, being nearly the same as, but darker than, the duskyish *chocolat-au-lait* tinge more or less developed along the croup of *S. Entellus*, being moreover darkest between the shoulders and upon the middle of the back, and paling considerably on the sides of the back and towards the rump: the Society's specimen is also probably of a less deeply sullied white underneath than that described by the author quoted, though sufficiently tinged with straw-yellow to render the specific appellation which I have bestowed on it not particularly appropriate.

Feeling no doubt, accordingly, that the Society's specimen is identical in species with that in the Paris Museum, the more especially as the latter was received from Malabar, whilst at Madras I learned that the Society's animal was there known as the Travancore Monkey, I cannot but express surprise that so experienced a student of Mammalia as my friend Mr. Martin is, should have hesitated at all about recognising this as a distinct species from the *S. Johnii*, from which (independently of colour) it conspicuously differs in having the hair of the whiskers and hack of the head not remarkably lengthened, and in having the same radiating centre on the forehead as the *S. Entellus*; the crown is, however, more densely clad, and with longer hair, than in the *Entellus*, which is not similarly appressed; but, in general characters, this species closely approximates the *Entellus*, much more than it does the *Johnii*, and with the next would appear to form with it a slight minimum subdivision of the genus, apparently peculiar to Continental India.

Of its habits, Mr. Jerdon writes me word, "The black-armed species is peculiar to the dense forest of the Western Coast. It abounds at the base of the Neilgherries in Malabar, Travancore, &c., lives in small troops, and has the usual loud cry of the others of this genus. The true *Entellus*, I have found chiefly in the neighbourhood of

\* The colour of the tail varies much in *S. Entellus*.

large towns, frequenting *groves*; also however in forest in Goomsoor, and open jungle in the Deccan. It is a much larger kind than the other."

Mr. Hodgson, in *J. A. S.* IX, 1212, has described the *Lungoor* of Nepâl as a particular species, by the specific designation *schistaceus*: it would certainly appear, from his description, to be distinct from the Bengal Hoonuman, both exceeding it in size, and differing from any of its varieties observed by me, in colour; and as the description furnished by that naturalist is brief, I shall here republish it, and then remark wherein it would appear to differ from the *Entellus*.

"Habit of *Maurus*: dark slaty above, below and the entire head, pale yellow; mere hands and feet somewhat darkened or concolorous with the body above; a pencil of black hairs radiating upwards from the brows, concolorous; tail longer than the body, more or less tufted; skin black, nude on face, and on last phalanges of anterior digits; hair on the crown short and radiated, on the cheeks long, directed back, and hiding the ears; piles or fur of one sort, not harsh, nor soft, more or less wavy, three to five inches and a half long on the body, closer and shorter on the tapered tail: thirty inches long; tail without the hair thirty-six; hand six and a half; foot eight and a half. Females smaller, with shorter canines. Habitat, the Tarai forest and lower hills [of Nepâl], rarely the Kachâr also."

Of the *Entellus* of the Southern Mahratta country, Mr. Elliot states, "An adult male measured, from muzzle to insertion of tail, one foot ten inches and a half; length of tail alone three feet two inches and a half; height from heel to crown three feet two inches and a half; weight twenty-two lbs.: ditto of an adult female eighteen lbs." Mr. Martin gives the admeasurements of the adult male, as two feet two inches from head to root of tail, the latter with hair three feet one inch. In an excursion which I made for the express purpose of observing and collecting some specimens of the Hoonuman of Lower Bengal, I procured a fine adult, but not old, male, and a much older, though still not past offspring-bearing, female, besides younger individuals; and I have since obtained other adults. The male measured twenty-four inches from crown to base of tail, the latter without hair thirty-eight inches, being mutilated of its extremity: the corresponding dimensions of the female were twenty-two inches and thirty-nine inches, the slight tuft at the end of the tail reaching to four inches more: hand of the male five inches and three-quarters (or measuring to the extremity of the naked space inside the wrist, nearly six inches and a half); of the female five inches and a half: foot of the male eight inches and a quarter, and of the female seven inches and five-eighths. These admeasurements were taken from the recent animals. The male here noticed has its permanent series of teeth complete, but quite unworn; whereas the female has its grinders worn down almost to the gums, and its canines to a level with the incisors, shewing a transverse section of their structure: how the latter should be thus worn away remains to be ascertained. The male was killed in the act of feeding on the pods of a common species of *Dolichos*, and the same appeared to constitute the contents of the stomachs of the others shot on the same occasion, so far as could be made out, and especially from the pale green colour of the thoroughly well masticated mass. This was at the end of January, and one I killed towards the close of July had been feeding on some kind of foliage, thus verifying the suggestion of Prof. Owen regarding the natural diet of this genus of Monkeys.

The female specimen here noticed is the darkest-coloured individual of *S. Entellus* I have ever seen, while the male is nearly identical in colour with the young (which do not appear to vary, at least more than in a very trifling degree); but his hands and feet are *wholly deep black*, as are likewise those of the female (the feet of the latter having some pale hairs intermixed), and as has equally been the case with all the adults I have noticed: whereas this black is much less strongly marked in the young, but is constantly present in different stages of development. Now Mr. Hodgson's *schistaceus* is stated by him to have the mere hands and feet *somewhat darkened, or concolorous with the body above;*" and the hue of the upper-parts is described to be "dark slaty," a term which could never have been applied even to the remarkably deep-coloured female *Entellus* now before me. On the other hand, this black does not in the least ascend the limbs of the latter specimen, wherein it conspicuously differs from *S. hypoleucos*. The hair on the cheeks of *schistaceus* is described to be "long, directed back, and hiding the ears," which last is certainly not the case in *Entellus*; and that of the body is mentioned to be "three to five and a half inches long," though it is possible that the word *five* has been here printed for the figure 3, in which case there would be no difference in this respect. The diversities indicated, however, are quite sufficient to warrant our pausing, for further evidence, before following authors in identifying the *Lungoor* of the Himalaya with the *Hoonuman* of the plains (at all events of Bengal), and the current statements, therefore, regarding the geographic range of the latter must, for the present, remain in abeyance.\*

Should the *Lungoor* prove distinct, no less than five species would accordingly represent this genus in the *Fauna Indica*: viz. *schistaceus* on the Himalaya, though, by the way, Mr. Hodgson describes this animal to frequent "the Tarai forest and lower hills, rarely the Kachâr also," of Nepâl, and it may be presumed that the Bootan species, and the alleged *Entellus* Monkey of other elevated regions of the Himalaya, will prove identical;—*Entellus* in Bengal, being probably that of the Indian peninsula generally;—*hypoleucos* and *Johnii* in the hilly regions of the South;—and *cephalopterus* in Ceylon.†

To resume my notice of the true *Entellus*, I observe that Mr. Martin asserts that—"In young individuals, the hands and feet are washed with dusky-black, *but this,*" he adds, "*is not always the case in adults*, which have a paler colouring altogether than the young, often verging upon dingy-white, tinged with straw-colour." This is opposed to what I have observed of those of Lower Bengal. Considerable numbers of

\* Mr. Fraser, in his "Notes on the hills at the foot of the Himala mountains" (Journal of Tour in do., p. 350), mentions "a long-tailed Ape of a *dark brown* colour, and considerable size," as common. The expression *dark brown* will certainly not apply to the Bengal Hoonuman. I have shewn our specimens of the latter to several gentlemen familiar with the *Lungoor* of the Himalaya, and the usual impression was, that they are different; but Dr. Falconer (a host in himself) is reluctant to consider them as distinct, although he, in common with most others, remarked at once the blackness of the hands and feet, as one difference from the *Lungoor*.

† A sort of *out-burst* of new species of mammalia, described or semi-described by Mr. J. E. Gray, of the British Museum, in the 'Annals and Magazine of Natural History' for December, 1842, has just reached me, wherein is assigned to *India* (Qy. Hindoostan?) a *Presbytis nobilis* (this very trivial subdivision being merged in *Semnopithecus* by most authors). It is described as "bright rufous, without any streak on the shoulders.—This species differs from the *Simia melalophos* of Raffles in being darker, and not having a black crest; from *P. flavimanus* in being of a nearly uniform auburn, and not yellow, with a blackish hack, and in having no black streak across the shoulders or on the cheek." p. 256.

the young may often be seen together in the shops of the Calcutta dealers, being all of one size and colour at any given time, and when about a quarter grown they may be described as having the head (except where naked), and the under-parts generally, much paler than the back, the hue of which is best expressed by the term — a light dingy isabella-colour; tail somewhat darker, its terminal third pale in some, while others have the whole tail pale; limbs slightly washed with greyish chiefly below the elbow and knee, and the fore-arm somewhat darker; the hands and feet nigrescent, more developed on the former than on the latter. The palest *adult* male that I have met with only differs in having these colours more distinctly brought out, and consequently contrasting, the entire hands and feet being conspicuously deep black, and a large lengthened space on the croup (scarcely traceable in the small young), being of a light chocolate-brown differing from the rest. A nearly half-grown young specimen has the shoulders, sides, humeri, and greater part of the thighs, of the same very pale colour as the head, and the moderately dark croup-patch well developed and strongly contrasting: another of the same size merely differs in having the croup-patch less defined, and spreading faintly over the shoulders and humeri; the blackish on the hands and feet increasing in intensity. Finally, the dark female (which, it may again be noticed, is much older than the male, having her teeth worn down to stumps, whereas those of the male already described, as also those of another male nearly as dark as the female, are quite entire, though I nevertheless have reason to suspect that these animals become darker with age,) has merely the colours generally much darkened, the hue of the croup spreading, but less deeply than on that part, over nearly the whole upper (or rather hinder) parts, being nearly identical with that of the fore-arm and leg, which are in part as dark as the croup itself; tail still darker for three-quarters of its length, but then paling to the tip; and the hair of the under-parts below the nipples deeply and very conspicuously tinged with orange-brown; hands and feet black (*i. e.* the hair of their upper surface as well as the palms and soles), as described. The visage of the male is much larger, with the muzzle more protruding, than in the other sex; the pair having a strongly characterized masculine and feminine expression.

From a passage in Moor's *Hindu Pantheon* (p. 320), it would seem that the Hoonuman has not unfrequently twin offspring; that author mentioning their scampering over the fields and hedges, when put to rout by the appearance of a stranger, "some with a young one under the arm, and a second clinging to the neck. The most numerous hordes of Monkeys," he continues, "that I ever saw were on the banks of the Jyghur river, between Bombay and Goa. In Guzerat, Apes [Monkeys] abound." The Hoonuman always descends from the trees upon alarm, at least where the ground is sufficiently open for them to make their way upon it (and I doubt whether they are elsewhere met with), and it should perhaps be added when no four-footed enemy awaits them there, from the pursuit of which they are secure above. The Tiger is known to make a frequent prey of them, and I imagine more commonly pounces on them when on the ground, than avails himself of the stratagem mentioned by Dr. Fryer and Mr. Forbes.\* Upon the approach of a human stranger, in European dress, they certainly always trust to their speed on the ground for security, and it is a beautiful sight to observe them fast scampering away, with the tail raised

\* *Vide* Forbes's 'Oriental Memoirs.'



to curve over the back; they seek to hide themselves in thick bushes, or more commonly upon trees which have sufficiently dense foliage for the purpose, but which are not too thick for them to observe what is going forward around; the bamboo and the tamarind tree are thus particularly selected, but not the mango which is too dense; and when a quick eye has discerned one couched within the foliage, or peering from behind a fork of the timber, of perhaps some isolated tree, away it will suddenly rush in the finest imaginable style to the ground through the branches, and make off with a rapidity which few marksmen could depend on checking. There are not many places, however, as is well known, where the Hoonuman can be shot at with impunity; but I know of one within a moderate distance of Calcutta, where the natives render every aid to the gunner who will help to rid them of these troublesome neighbours: another tide up the river, and we arrive at Gouptipara,\* the scene of M. Duvaucel's anecdote of one these Monkeys; and there, as in his time, the Hoonumans are strictly protected. That accomplished naturalist remarks that the appearance of this species in Lower Bengal takes place principally towards the latter end of winter; upon which Mr. Martin notes, that it appears to migrate from the upper to the lower provinces of this part of India. I can only state that I have found them equally numerous in July and January in the particular locality adverted to, and that I have seen them in June close to Calcutta on the opposite side of the river. With respect to the alleged migration of the Himalaya species (?), also, Capt. Hutton mentions, that—"This species is found at Simla all the year through, but when the snow falls during the winter it seeks a warmer climate, in the depth of the *Khads*, returning again to the heights as it melts away. I have seen them, however, on a fine sunshiny day even with the snow on the ground, leaping from tree to tree up and down the hill of *Jakú* at Simla, which is 8115 feet. Royle," continues this observer, "is mistaken when he says, that the *Entellus* alone ascends in the summer months as high as 9000 feet! I have seen them at *Nágkunda* in August at 9000 feet, and in winter on *Háttú* mountain which is 10,655 feet; and in winter at Simla with snow four or five inches deep, and hard frosts at night, as high as 8000 feet." The *Macacus Rhesus*, also, was seen by this observer "repeatedly during the month of February when the snow was five or six inches deep at Simla, roosting(?) in the trees at night, on the side of *Jakú*, and apparently regardless of the cold." *J. A. S.* VI, 934-5.

I know of one locality where the whole numerous community of Bengal Hoonumans appears to consist of males only, of different ages from half grown or less to adults; and the natives of that part say that furious battles are frequent among them: whereas the great majority are females in the other locality that has been spoken of, and it is understood that each male attached to a flock of females allows no other male, even half-grown, to approach them. Though a stream navigable for boats passes through the jungle inhabited by the latter community, or probably series of communities, with plenty of Hoonumans on each side of it, the natives of the place informed me that they had never known one to pass across, or in fact to enter the water.

*S. pileatus*, *Nobis. n. s. ? Cercopithecus albocinereus ?*, Desmarest. A particularly handsome (half-grown) specimen of an animal of this genus has been received by the Society from Barrackpore, stated to be Malayan, but which I cannot identify with

\* Not *Goalpara*, as Mr. Ogilby surmises; but *Gouptipara*, as Mr. Duvaucel spelt it, and as it is also spelt in the maps, — a place on the right bank of the Hoogly, opposite Santipore.



any of those described by Mr. Martin. It most nearly accords with M. Desmarest's description of his *Cercopithecus albocinereus*, as rendered by Mr. Martin in his account of *S. comatus*; one exception being, that the ears of the latter are stated to be "large, naked, angular, and black," whereas in the specimen before me they are proportionally smaller than in the *Entellus*, and their duplicature above is well clad with whitish hairs. The general aspect of this animal recalls to mind that of a Lemur: having the fur softer, longer, and more dense than in the *Entellus*, and the tail well clad and distinctly tufted at its extremity; there is no radiating centre, nor vertically raised crest, upon the head, and the fur of the occiput is rather short (wherein it decidedly differs from *S. obscurus*); but the usual superciliary black hairs are of considerable length, and behind these the fur of the forehead is rather short and directed backward, being mingled with longer black hairs on the sinciput directed laterally, while those of the crown also are a little lengthened and stand out behind, overhanging the occiput, thus imparting somewhat the appearance of a small flat cap laid upon the top of the head; there are also a few scanty fine black hairs on the sides of the face and of the upper lip. General colour a delicate soft grey, rather darker on the upper part of the back, and slightly inclining to albescent on the arm, fore-arm, and leg; tail a little sullied with yellowish brown, and darker towards its extremity, which is of a dusky-brownish hue: sides of the crown blackish, chiefly from the intermixture of the laterally disposed fine black hairs already mentioned; the forehead somewhat pale; face black as usual; the hair of the cheeks whitish and strongly contrasting, being considerably lengthened laterally and posteriorly, so as to hide the lower part of the ear, behind which is also some similar long and glistening whitish hair continued from beneath; scanty beard also whitish; and the whole of the lower parts and inside of the limbs dull fulvous-white: the hands have a slight blackish stain, except on the penultimate phalanges of the digits, and the feet have a similar stain on the first or basal phalanges only; hence the adult animal would perhaps have the hands and feet black, as in the true *Entellus*, or partly so. The specimen described is a female; and, should it prove new, the species might be appropriately termed *S. pileatus*. I may add, that the skin is everywhere of a light colour, except on the naked parts. The dimensions of the recent animal were—from vertex to tail eighteen inches, the tail twenty-eight inches and a half, or with its terminal tuft thirty-one inches; length of humerus six inches, of fore-arm the same, and of hand four inches and a quarter; femur seven inches and a half, tibia seven and three quarters, and foot from heel six inches and a quarter. Irides rather pale brown.

I strongly incline to suspect that this handsome Monkey is of the species termed *albocinereus* by M. Desmarest, of which he states that it is "a new species (not figured), from the collection preserved in the [Paris] Museum, and brought by M. M. Diard and Duvaucel. Country, the Island of Sumatra." M. Isidore St. Hilaire, however, according to Mr. Martin, states that "no such animal was ever brought from India [the East] by M.M. Diard and Duvaucel, answering to Desmarest's description, nor does any specimen agreeing with it, exist in the Museum of Paris. During the author's [Mr. Martin's] recent visit to Paris, he examined, separately, every Monkey in the Museum, and, certainly, could discover no species to which the description could be said to be fairly applicable. Moreover, every specimen brought from Java or Sumatra, and obtained there by M. M. Diard and Duvaucel, is well

known, and the species are not to be mistaken." There is accordingly no means of determining, with certainty, whether the animal here described is identical in species with that of *M. Desmarest*, but the probability is certainly in favour of the identification.

At present, we are really quite ignorant of what species of Monkeys inhabit the countries bordering on the Bay of Bengal to the eastward. The *Semnopithecus obscurus* (Reid, *P. Z. S.* 1837, p. 14,) has recently been discovered by Mr. Cuming to be very common at Singapore, "varying greatly in the depth of its colouring, no two specimens being precisely the same. The general hue ranges from greyish-black, or smoke-grey, to black; the [lengthened] occipital crest and the tail being always paler than the rest." And as the *Hylobates Lar*, previously known only as an inhabitant of the Malay peninsula, has been received by this Society from Moulmain, where it is most probably the common species of the interior adverted to by Helfer, it is likely that *Semnopithecus obscurus* extends its range similarly northward, and that it is the *maurus* of Dr. Helfer's list, mentioned as "a very wild inhabitant of the loftiest trees, and considered the best food by the Kareans, who shoot it with poisoned arrows." The true *maurus* appears to be confined to Java, being replaced in Sumatra by *femoralis*—the doubtfully cited *maurus* of Sir Stamford Raffles.

P. 840. Returning now to my first Report, in the page cited I have mentioned specimens of *Pteropus Edwardsii* vel *medius* from the vicinity of Madras and from Travancore, the latter with a note of doubt which may now be cancelled, as I have obtained the same variety of colour here, as well as intermediate specimens; and Mr. Hodgson has also forwarded specimens of his *Pteropus leucocephalus* and *Pt. pyrivorus* from Nepál (vide *J. A. S.* IV. 700), the former being (as already asserted by Mr. Ogilby) perfectly identical with *Edwardsii*, and the latter is *Pachysoma marginatum*, also common here. A third species of Indian frugivorous Bat, the *Pt. Dussumieri*, Is. Geoff. (*Zoologie du Voyage de M. Bélanger*, p. 89), is still wanting to our collection. Length about eight inches, and extent nearly two feet and a half. Face and throat brown; the back and belly covered with brown hairs having some whitish ones intermixed; the upper part of the breast russet-brown; and sides of the neck, from the ears to the insertion of the wings, fulvous with a shade of russet. Specimens of this Bat were obtained "on the Continent of India" by M. Dussumier, and recently by Dr. Royle near Saharunpore. The *Pt. Javanicus* occurs in the Tenasserim provinces, and a new species has been described by Dr. McClelland from Assam, as *Pt. Assamensis*, *P. Z. S.* 1839, p. 148.

*Taphozous*. For descriptions of four Indian species of this genus of Bats, vide X, 971, and XI, 784.

The Reptile cited as *Varanus binotatus* is my *V. Bibroni*, XI, 869.

P. 841. *Hæmatornis pusillus*, Nobis, or *Ixos pusillus*. This distinct species appears to fill the place, in the peninsula of India, of *I. Cafer* of Bengal and Nepál, which latter was unknown to Mr. Jerdon who so designated the other. It also inhabits Arracan.

P. 922. The two races of *Buceros ruficollis* noticed, as inhabiting the Tenasserim provinces, have proved to be distinct species; of which the true *B. ruficollis*, Vieillot, is distinguished by its superior size, the flatness of its casque, and the lateral transverse ridges on the basal portion of the bill itself; these last being constantly wanting in the other, which has likewise the casque much more elevate or convex. In my Report to Government on a collection of Tenasserim specimens forwarded by the late Dr.

Helfer, I have designated the latter species of Hornbill — *B. subruficollis*: the two present no difference in plumage.

*B. leucogaster*, Nobis, is identical with *B. albirostris*, Shaw, erroneously identified by Mr. Jerdon with *B. Malabaricus*, which is *B. monoceros*, Shaw. The latter appears to be restricted to Hindoostan and Ceylon, being replaced in Bengal, Assam, and the Tenasserim provinces, by the present nearly allied species, which differs in being smaller, in having the casque much less compressed, the black mark on this being also differently placed, and especially in the colouring of the tail, *B. Malabaricus* having the three exterior *rectrices* wholly white, and the next chiefly so, while in *B. albirostris* they are only tipped with white. The specimen of the latter described as *B. leucogaster*, was immature.

P. 923. The *Oxylophus* described is *O. Coromandus*.

*Phœnicophæus longicaudatus*, Nobis, is the *Melias tristis* of Lesson; whilst my *Ph. tristis* described in the Monograph of Cuckoos (XI, 928), would appear to be his *M. Diardi*, a specific name, however, which yields precedence to *Sumatranus* of Raffles. These and other emendations and additions to my paper on *Cuculidæ* have been put together as an appendix to that Monograph, which is awaiting publication.

P. 924. *Ianthocincla leucolophos*? var., is the *Garrulax Belangeri* of Lesson.

*Muscipeta Indica* vel *castanea* becomes, with full maturity, *M. paradisea*; vide XI, 884.

P. 925. *Ciconia nudifrons*, Jerdon, should be *C. nudifrons*, McClelland, and *C. calva*, Jerdon; *C. immigratoria*, Hodgson; and I much suspect *C. Javanica*, Horsfield, vel *C. capillata*, Temminck. It is common about Calcutta, where the only additional species of 'Adjutant' is the great *C. argala*: besides these, there are the *C. nudifrons*, Jerdon (not of McClelland), in the Indian peninsula, and the *C. cristata*, McClelland, in Assam; also, in the latter country, I am told that there is an 'Adjutant' with a black breast.

P. 917. For *Anthus rufescens*? read *A. agilis*; and for *Motacilla alba*, *M. leucopsis*, Gould, vel *alboides*, Hodgson, — long ago figured by Sonnerat.

*Tadorna Bellonii*. Not very uncommon.

Vol. XI, p. 95. I may here anticipate the publication of my paper on Indian Moles (*Talpa*), which is awaiting the arrival of some Assamese specimens for examination and comparison, by mentioning that the Sylhet species is very different from those of Nepâl and Darjeling, which latter differ, the Nepâlese (*T. micrura*, Hodgson,) in having a short but very distinct tail, whilst the latter (*T. cryptura*, Nobis,) has only the merest rudiment of this appendage, as shewn by two specimens of this last in the Society's Museum, one of them being in spirits. The Assamese species appears to be at least allied, if not identical, with that of Sylhet.\*

P. 98. The species of Weasel noticed by the provisional name *humeralis*, I have since been induced to suspect is identical with *Putorius Subhemachelanus*, Hodgson, J. A. S. VI, 564, as already mentioned in a note to XI, 280.

\* I have just received a letter from Major Jenkins, Political Agent in Assam, announcing that he has forwarded a specimen of the Assamese Mole in spirits, in obliging compliance with my request of him.—This has since arrived, and appears (so far as can be judged from its external characters) be identical with *T. micrura* of Nepâl; so that there are two distinct species of this genus in Assam.

P. 100. When tracing the geographic range of the common Jungle Cat of Bengal (*Felis chaus*), I strangely did not think of referring to Mr. Elliot's valuable list of the species of Mammalia inhabiting the Southern Mahratta country (*Madr. Jl.*, No. XXIV, p. 108), or I should have been there informed of its occurrence in Southern India. The *F. viverrinus* has lately been obtained by me in the vicinity of Calcutta.

P. 102. To the species of oriental Hare adverted to, add the Tibetan *Lepus pallipes*, Hodgson, p. 288 *seq.*, and the Tartarian *L. tolai*, Pallas. *L. ruficaudatus* is stated, in the *Zoologie du Voyage de M. Bélanger* (p. 157), to have been "discovered in Bengal by M. Duvaucel. It likewise exists in the neighbourhood of Pondicherry," continues M. Isidore St. Hilaire, "and in various other parts of India. Lastly, it has more recently been met with in the Isle of France, by M. M. Quoy and Gaymard." This Society has lately received the other Indian species (*L. nigricollis*) from the Isle of France, and this alone is mentioned to exist there in M. J. Desjardins' list of the mammalia of that island, in *Proc. Zool. Soc.* for 1831, p. 46.\* The European *L. timidus* is mentioned, in addition to *L. ruficaudatus* and *L. (vel potiús Arctomys?) hispidus*, in Dr. Walker's catalogue of the mammalia of Assam, published in McClelland's Journal, No. X, p. 367: but should this introduction of it repose solely on the authority of the notice referred to this species in *Proc. Zool. Soc.* for 1839, p. 152, then I think we might infer that it may be safely withdrawn from the list of Assamese mammalia, as there can be little doubt of that notice referring to *L. ruficaudatus*. In a catalogue which I have received of a collection of British specimens, for the Society's Museum, which are now on their voyage to this country and may shortly be expected, it appears that examples have been sent of the four species of *Lepus* found in the British islands, which will afford the means of comparing Assamese specimens of reputed *L. timidus* with the animal of Europe.

P. 105. *Picus sultaneus*, Hodgson; vide p. 970: in reference to which Mr. Jerdon suggests, with much probability, that Dr. Horsfield's alleged female of *P. strictus* must have been a young male of that species.

P. 106. To the list of Indian species referred to Mr. Hodgson's genus *Chaitaris*, add the *Muscicapa banyumas*, Horsfield (vel *M. hyacintha*, Tem. apud Tickell, *J. A. S.* II, 574), which is closely allied to *Ch. rubeculoides* — the *Phœnicura rubeculoides*, Vigors and Gould. Mr. Hodgson has also forwarded to the Society a *Ch. auricularis*, a figure of which occurs among Dr. McClelland's drawings of Assamese birds. *M. cantatrix*, Temminck, is identified by Dr. Horsfield and others with *M. banyumas*; and the *M. rubecula*, Swainson, apud Jerdon (*Supplement*), is now suspected by that naturalist to be merely the female or young male of *banyumas*, "so that the label in the French Museum, as quoted by Swainson, may not be so erroneous as he imagines." The *Muscicapa aurea*, Auct., would also appear to be no other than *banyumas*.†

\* I fancy there must be some misconception here, on the Part of M. Is. Geoffroy. The Pondicherry species (*nigricollis*) inhabits the Mauritius, having doubtless been introduced there; but I much doubt whether the other (or *ruficaudatus*) occurs in Southern India at all. The "Indian Hare" may have been brought by M. M. Quoy and Gaymard from the Isle of France, being the Pondicherry species — *L. nigricollis*, and not *L. ruficaudatus*.

† Thus extended, indeed, the genus will bear further separation: *Chaitaris* comprising *Ch. grandis*, *Ch. sundara*, *Ch. McGregorii*, and *Ch. auricularis*; whilst the (*aurea*? vel.) *banyumas*, the *rubeculoides*, and the *Saxicola nigrorufa*, Jerdon, constitute another small group more nearly allied to the Flycatchers.



P. 110. The *Ichthyæetus cultrunguis*, Nobis, proves to be merely the young of *Haliaeetus blagrus*, which is not an uncommon species in Lower Bengal. *H. plumbeus* of Hodgson (referred to) is identical with *Ichthyæetus Horsfieldi*, likewise here met with.

P. 112. *Numida maculipennis*!, Swainson. A domestic example of this redoubtable alleged *species* is now in the Museum.

P. 113. I have here given a list of the wading birds of the families *Scolopacidae*, *Charadriidae*, and *Rallidae* of Vigors, and also of the *Anatidae* and the Grebes, which I had obtained in the Calcutta bazar up to the time of writing; and now, with another year's experience, I have little to add to my former catalogue, and few modifications thereof to offer.

*Totanus ochropus* and *T. hypoleucos* I have since met with, but neither is common, the former usually occurring in pairs, the latter in small flocks. *Tringa platyrhyncha*, of which I saw and obtained but one specimen throughout the preceding season, has been tolerably common during the last. *T. Temminckii* is chiefly brought about the commencement and close of the season, two or three specimens frequently occurring among the heaps of *T. minuta*, and occasionally greater numbers, even as many as three or four dozen together; yet out of this multitude, the collector may fail to obtain a single specimen fit for preservation, from the vexatious habit most of the dealers will persist in of partially plucking every bird they bring, despite all that can be said to them, and thus ruining many ornithological desiderata; it is thus that I have been unable to get fine summer-plumage specimens of this bird, though many were brought.\* *Terekia Javanica* (vel *orientalis*) is rare, as I saw but a single specimen during the preceding season, and two only in the course of the following one. *Scolopax heterura* is seldom brought except about the beginning and end of the cool season, when it is numerous. *Rhynchea Capensis* breeds here. *Squatarola cinerea* should not have been termed common, as it is rather unfrequent (I obtained extremely fine summer-plumage specimens in May, and also of *Tringa subarquata*, the latter being numerous); Mr. Jerdon has lately obtained *Sq. cinerea* in Southern India. The "larger species of Ring Plover," mentioned in my list, comprised two very similar species which I will notice presently. I have recently obtained a pair, separately, of *Ch. Cantianus*. *Pluvianus Goensis* is common: *Pl. bilobus* rare: *Pl. cinereus*, Nobis (*J. A. S.* XI, 587), has now and then occurred during the past season: and the undetermined species, with powerfully spurred wings, mentioned in a note, proves to be the Australian *Pl. lobatus* (v. *Lobivanellus lobatus*, Gould, and *Vanellus gallinaceus* of Jardine and Selby's 'Illustrations,' agreeing with the figure by the latter authors in the degree of development of the naked skin of the forehead, which is much less than is represented by the former naturalist); it is not Indian: two other species which are so, and have not yet been obtained by me, are *Pl. ventralis* figured by Hardwicke and Gray, and *Pl. spinosus*? the *Black-sided Sandpiper*, Latham, also figured by Hardwicke and Gray.† *Eidionemus crepitans* — I have obtained one specimen. *Parra Sinensis* in breed-

\* Mr. Jerdon has once obtained *Tr. Canutus* near Madras, which he has sent to this Museum, and recently, as he writes, *Tr. alpina*. Both may be presumed to be very rare.

† For a natural arrangement of the Plover group, by Mr. Strickland, where for the first time the respective value of the characters derived from the presence or absence of a back toe, and the form of the wings and general character of the plumage, are duly recognised, vide *Proc. Zool. Soc.* 1841, p. 32.



ing plumage is common during the rainy season. To the list of *Rallidæ* may be added *Gallinula lugubris*, Horsfield, and *Rallus* (?) *rufescens*, Jerdon : but I have scarcely obtained any examples of this group during the past season, as no *shikaree* has regularly brought them; whereas formerly one came daily with a cageful of *Porzana maruetta* and *P. Bailloni*, with occasionally other species, as *P. rubiginosa*, *Rallus aquaticus* and *R. Javanicus*, &c. For remarks on the Indian species currently referred to *Gallinula chloropus*, vide p. 887: it is distinct from the European *chloropus*, of which I have lately seen a specimen killed in the Mauritius; being inferior in size, with constantly a much less developed frontal shield: hence I propose that it should be termed *G. parvifrons*: Mr. Jerdon informs me, however, that he thinks he has lately obtained the true *chloropus*, additional to the smaller species, in Southern India.

The specimens of *Podiceps cristatus* formerly mentioned, I have since ascertained to have been from the Cape of Good Hope; and up to the present time have only obtained *P. minor*, which is abundant.

Of *Anatidæ*, there have been no additional species: and the only remark I have to make is that *Fuligula nyroca* has been far from plentiful last season, whereas in the preceding one it was particularly abundant. *A. boschas* has never occurred, though so many of the common British species are at least equally numerous in this neighbourhood.

In the Society's Museum is a specimen, received from the Cape of Good Hope, of the *Fuligula mariloides* lately characterized in Mr. Yarrell's 'History of British Birds.' Being well acquainted with *F. marila*, though the Museum does not contain a specimen of it, I never could assign the present bird to that common British species, and it remained unlabelled till the arrival of the number of Mr. Yarrell's work containing the figure and description of *F. mariloides*. The Society's bird is, however, considerably less bright in colour than that described by Mr. Yarrell, being probably a young male. Head and neck as in the description referred to, but the crown much darker, or glossy reddish-dusky, passing as a line down the back of the neck; lower part of the neck and sides of the breast dusky, the middle of the latter dark brownish, becoming gradually paler on the belly; sides a little speckled, and the feathers margined with light rusty-brown; whole upper-parts dusky-brown; interscapularies margined with pale brown, and all minutely speckled with the same; wings brownish-dusky, a little speckled anteriorly, the coverts of the secondaries white at base, forming the speculum, and tipped with dusky; most of the tail-feathers margined with dull whitish; and a light colcothar tint upon the flanks: length of the closed wing eight inches and three-quarters; of the bill to forehead an inch and three-quarters. I can feel no doubt of the specific identification.

The two very similar species of Ring Plover must, now be reverted to, the description of which has been postponed (p. 179).

*Charadrius Geoffroyi* (?), Wagler. For this presumed identification I am indebted to Mr. Jerdon. Length eight inches and a half to eight and three-quarters, by seventeen and a quarter to eighteen inches in extent; wing from bend five inches and a quarter to five and five-eighths; and tail an inch and seven-eighths to two inches: bill to forehead an inch; and tarse an inch and a half. Winter plumage greyish-brown on the upper-parts, ear-coverts and beneath the eye, and sides of the breast; the

rest of the under-parts, with the feathers immediately above the bill, and a streak over the eye, white; primaries darker, and the secondaries partly white on their outer web. Bill wholly blackish; legs pale greyish-green, the toes darker. In summer dress, the forehead, lores, ear-coverts, and beneath the eye, are black, having a white mark on each side of the forehead; the neck and breast are bright rufous, contrasting with the pure white throat; the head is deeply tinged with rufous, more or less; and the back and especially the scapularies are partially margined with the same. This bird is much less common than the next, and I have only now and then found one among the heaps of the other species in the bazar: Mr. Jerdon has recently met with both in Southern India; and the Society has received both species from Mr. Hodgson of Nepâl. *Ch. Geoffroyi* is described by Wagler from Pondicherry.

*Ch. Leschenaultii* (?), Lesson, *Man. d'Orn.*, II, 232. *Ch. griseus* (?), *Mus. de Paris*. For these presumed identifications I am also indebted to Mr. Jerdon. Precisely similar both in summer and winter plumage to the preceding species, but considerably inferior in size, with a proportionably smaller and rather differently shaped bill. Length seven inches and a quarter, by fifteen and three quarters in extent; wing five inches, tail an inch and seven eighths, bill to forehead three quarters of an inch, and tarse an inch and a quarter. Irides blackish, as in the other; legs more or less plumbeous, the toes darker. The young have the scapularies and wing-coverts, and the feathers of the back more slightly, margined with pale fulvous, and a distinct tinge of the same upon the breast. This species is brought in great numbers to the Calcutta bazar throughout the season, but neither it nor the preceding one can be obtained in summer garb before May.

P. 199. *Timalia Horsfieldi*, Jardine and Selby, is identical with *T. hypoleuca*, Franklin, which latter appellation holds precedence. I understand that both this and *T. hyperythra*, Franklin, have recently been figured by M. Guérin in his *Magasin de Zoologie*. The former constitutes Mr. Hodgson's genus *Chrysomma*.

*Mirafra Assamensis* is not the species assigned doubtfully to *M. Javanica* by Mr. Jerdon; and allied to the latter are two or three in Southern India which I shall leave that gentleman to describe. One, the *Aggun* of the South (*M. cantillans*, Jerdon, *M. S.*), I have also obtained near Calcutta. It is a particularly fine songster.

P. 201. The species assigned by me to *Alauda gulgula*, Franklin, and *A. gracilis*, Nobis, had also better remain in abeyance for the present. The former, however, may be here styled *A. Gangetica*, vide description, *loc. cit.*

P. 202, and also p. 587. For *Carbo pygmaeus* read *Phalacrocorax Javanicus*, which is common in the Hoogly. Indeed, *Ph. Africanus* (stated by Lesson to inhabit India) would seem to be no other.

P. 203. Two species are confounded under the description of *Muscipeta atriceps*, Nobis; the supposed female being my *M. plumosa*, p. 791. The former is nearly allied to *M. Borbonica*, which the Society has since received from the Isle of France, but is larger.

P. 204. The *Prinia pileata*, Nobis, must be referred to *Timalia gularis*, Horsfield, vide p. 794.

P. 455. Genus *Manis*. I have recently had the various Pangolin skins in the Society's Museum relaxed and mounted, when it appeared that the observations of Lieut. Tickell and others respecting the mode of progression of *M. brachyura* do not

apply to the genus generally. That species walks pretty much in the manner of the *Myrmecophaga jubata* of South America, on the soles of the hind-feet, while the huge claws of the fore-feet are bent up against the palms, the animal resting not exactly on its knuckles, but on the basal part of its fore-claws. In *M. leptura*, Nobis, *loc. cit.*, however, wherein the claws of the hind-feet are much more developed, it would appear that both fore and hind claws turn inward when the creature walks; and in *M. Javanica* it appears very doubtful whether the animal does not walk on the palms of its fore-feet, with the claws straight out in front, as well as on the soles of its hind-feet. At all events, it was found impracticable to double up the fore-feet of the two latter species, as represented in Lieut. Tickell's sketches of *M. brachyura*; whereas two examples of the latter were mounted without difficulty in the attitudes represented by that observer.

P. 456. *Spizaetus albogularis*, Tickell, has, as I have been informed by Mr. Jerdon, been recently described in M. Guérin's *Magasin de Zoologie* by the name *Asur Kienierii*, received from the Himalaya (?). The latter specific appellation holds precedence.

P. 457. *Strix lugubris*, Tickell; *Ninox Nipalensis*, Hodgson. "Decidedly, I think, the *Noctua hirsuta*, Tem., *Pl. Col.* 239 (289?)." Jerdon. Also *Strix scutulata*, Raffles, *Lin. Trans.* XIII, 280, which name I presume to have the priority.

P. 459. The *Parus Nipalensis*, Hodgson, there described, is the *P. atriceps*, Horsfield, of Mr. Jerdon's catalogue.

P. 460. *Petrocincla Manillensis*, Auct., and *P. pandoo* aut *maal* of Sykes. The birds referred to under these denominations are most puzzling, and I now incline to suspect that these if not four closely allied species will eventually prove to inhabit South-eastern Asia and its islands. In *loc. cit.*, I have described a male from Luçonia, which is unquestionably the *Turdus Manillensis*, Gmelin, while there is every reason to presume that the *T. eremita*, Gmelin, refers to its female, as *Petrocincla maal* of Sykes is the female of his *P. pandoo*. The Society has just received a male and female obtained in the vicinity of Macao, which would seem to be of the same species. In these three specimens the tail is perfectly squared, and both the males have the under-parts from the breast bright ferruginous, each feather more or less tipped with cyaneous, then black, and finally with white: axillaries and under wings-coverts also ferruginous in the Chinese specimen, but the axillaries only in that from Luçonia; and the female from Macao has likewise a conspicuous rufous tinge on the under wing-coverts: tibial feathers cyaneous in both, and a considerable admixture of the same on the posterior flank-feathers. The Luçonia bird has its plumage worn, that from Macao recently renewed; but the mottlings were originally somewhat different in the two. In the latter each feather of the upper-parts has a conspicuous subterminal black bar, and is tipped with white on the middle of the hack, scapularies and wings, and with greyish-brown on the crown, neck, and fore-part of the back; these mottlings becoming nearly obsolete on the rump: the feathers of the breast are tipped with white, having a subterminal narrow blackish bar, of a semi-circular form or tending a little to be angulated in some. In the Luçonia specimen, these black subterminal bars on the fore-part of the neck and breast are much broader, and of a V-like shape, enclosing a triangular fulvous-white-spot; this white being purer and more developed in the other: the feathers of the upper-parts, also, are merely tipped

with dingy-brown, retaining some traces of the whitish extreme tips on the lower-part of the hack, and more conspicuously on the scapularies and wings. The Chinese female specimen differs so much from the females of *P. pandoo* of peninsular India, that I cannot regard them as identical in species: its differences corresponding with those of the Chinese male. Head and neck dull slaty with brown margins and paler tips, the latter inconspicuous; hack and scapularies with subterminal dusky bars and whitish edges; and the dull cyaneous tinge of the upper-parts increasing on the rump: the entire under-parts are *much paler* than in Indian specimens, being wholly of a dull whitish-fulvous, tinged with rusty on the throat and lower tail-coverts, each feather having two narrow blackish bars, one near the margin, the other central and confined to the vicinity of the shaft. Upon full consideration, I consider the Chinese and Philippine Islands specimens to be of the same species, or *Petrocincla Manillensis* vera.

A second species appears to exist in the specimens from the Tenasserim provinces, and to this I refer a fine male from Darjeeling, where the collector lately employed by the Society never obtained more than this one example. Judging from the Darjeeling specimen (for those from Tenasserim have the tail imperfect), it would appear readily distinguishable from *P. Manillensis* by the shape of the tail, which (instead of being squared) has its outermost feathers nearly half an inch shorter than the middle ones. The mottlings of the upper-parts are nearly obsolete, and those of the lower-parts but little more developed; and there would appear to be generally some trace of ferruginous, more or less: in the Darjeeling specimen this is confined to the lateral margins of two or three of the lower tail-coverts; and successively more developed in two from Tenasserim, as formerly described by me. I shall designate this presumed species *P. affinis*.

The third form is the *P. pandoo* of Hindoostan, which would appear to have never any rufous whatever, and has the tail intermediate in shape to those of the two preceding. M. Lesson doubtless refers to this, when he states the *P. Manillensis* to inhabit India; and with the data formerly before me, I cannot wonder that I also referred it to the same.

P. 461. The *Erythrospiza* noticed is certainly the *Gros-bec Rose des Indes*, or *Coccothraustes rosea*, Vicillot, of the *Dict. Class. d'Hist. Nat.*, and is rightly identified as such by Mr. Jerdon, who adds to its synonyms the "*Loxia Madagascariensis* and *L. totta* of English authors": but the *Fringilla rosea*, Latham, is given as a distinct species by M. Drapiez.

P. 462. The specimen referred to *Polyplectron Northiæ* of Hardwicke and Gray is recognised by Mr. Jerdon as the female *Francolinus spadiceus*, to which the former term may accordingly be attached as a synonym. *Vide* descriptions of both sexes in the *Zoologie du Voyage de M. Bélanger*.

P. 463. *Carbo albiventer*, Tickell, or rather *Phalacrocorax albiventer*. The specific name, however, I fear is objectionable, from applying only to the immature plumage of the species, since I incline to identify with it a specimen from Tenasserim in adult plumage, wherein the feathers of the under-parts are only white at base. The colouring of the hack in this specimen is nearly as in *Ph. carbo*; the head and neck dull shining black, slightly tinged with greyish-brown; the throat below the gular skin white, passing above the gape and forward to the eye, where it deepens to light



brown; the rest of the lower-parts black or blackish slightly glossed; and the feathers at the sides of the throat or lower part of the neck are white nearly to their tips, which are broadly terminated with black, and have a silvery spot above this: beak dusky above, the rest whitish; and gular skin apparently has been yellow. Rare in Central India, and occurs in Assam and in the Tenasserim provinces.\*

*Ptilinopus purpuratus*. It has been suspected that different species are confounded under this name, and certainly the specimen from the Caroline Islands, here noticed, would hardly seem to be identical with that figured by Messrs. Jardine and Selby, *Ill. Orn.* pl. LXX. It agrees more with the description in Shaw's 'Zoology,' XI, 67, which I believe is copied from Temminck, who styles it *Columba kurukuru*; but one marked peculiarity consists in the entire tail being tipped with yellow for three-quarters of an inch, while there is no trace of this colour margining the green portion externally. Crown beautiful purplish-lake, with a slight trace of a yellow margin posteriorly; entire neck, throat, and breast, with the lores and ear-coverts, pale greenish-yellow; scapularies, interscapularies, rump, and upper tail-coverts, a full and tolerably bright green, having a slight cast of aureous; wings and basal portion of tail much finer green, the tertiaries margined with greenish-aureous, and (excepting the largest one) having an amethystine spot, not very bright, within the margin; a purplish patch on the fore-part of the belly, the rest of which is greenish inclining to yellow, and the lower tail-coverts are bright yellow.

P. 465. *Gracula religiosa*. The species here noticed I take to be the *Eulabes Javanus* of Cuvier, which is common in the hilly regions of Bengal, and the Society has received it from Nepál and Tenasserim. The *Gracula religiosa* of Mr. Jerdon's list is what I presume to be the *Eu. Indicus*, Cuvier. In M. Lesson's *Traité d'Ornithologie*, as I am informed by Mr. Jerdon, *Mainatus Sumatranus*, Lesson = *Eulabes Javanus*, Cuv., and *Gr. religiosa*, Latham and Vieillot; whilst *M. Javanus*, Less. = *Eu. Indicus*, Cuv., *Pastor musicus*, Tem., and also *Gr. religiosa*, Latham. The following are the distinctions of the two species known to me, which I give, as I have seen no satisfactory descriptions of them.

*Gr. religiosa*, Lin: *Eulabes Javanus* (?), Cuvier; not *Mainatus Javanus* of Lesson, but his *M. Sumatranus*. Distinguished from the other by its superior size, the much greater thickness of the bill, which is also more deeply cleft, the large space covered with short velvety feathers on the sinciput, above which there is no continuation of the naked skin from the occiput, and by the more brightly glossed and separated feathers of the forehead and middle of the head. Length eleven inches and a half by nineteen inches in alar expanse; wing six inches and five-eighths, and tail three inches and a quarter. The bill measures an inch and a quarter to forehead through the feathers, and an inch and a half to gape, being above half an inch in vertical depth; tarsi, measured posteriorly, an inch and one-eighth. Irides dark hazel; bill yellow at the tip, the rest bright coral-red; the bare skin of the head and mobile flaps yellow; and legs orpiment-yellow.

*Gr. Indicus*: *Eulabes Indicus* (?), Cuv.; *Pastor musicus*, Tem.; *Mainatus Javanus*, Lesson. Closely allied to the last, but smaller, with the bill and legs less robust, especially the former, and the patch of velvety feathers on the sinciput greatly reduced in size, being bounded above (as well as below) by the naked skin folded

\* Mr. Jerdon writes me word that he has just obtained it at Nellore.



into minute lappets. Plumage quite similar. Length ten inches and a quarter by seventeen inches and a half in alar expanse; of wing five inches and three quarters, and tail two inches and seven-eighths. Bill an inch and one-eighth to forehead, and nearly an inch and three-eighths to gape, being only three-eighths of an inch in vertical depth. Its colour inclines to coral-red, or carrotty, with a yellow tip; and the irides, naked skin, and feet, are similar in hue to those of the other. Described from an old cage bird, which was brought to me dead, but in good plumage; and on my suggesting to Mr. Jerdon that this is probably, from the dimensions he has given, his species of Southern India, the anticipation proved to be correct. I am informed, however, that it is likewise found in Bengal, but have never seen one among the many of the other species constantly exposed for sale by the Calcutta bird-dealers.

P. 586. *Garrulax leucogenys*, Nobis. The specimen, as I am now informed, was brought from China; and it is evidently the *Corvus auritus* of the old authors, or *Garrulax auritus*, hodiè; *Spreo auritus*, Lesson. Mr. Frith has favoured me with an interesting notice of the individual, which was excessively tame and familiar, and delighted (like a Cockatoo) in being caressed and tickled by the hand, when it would spread out its wings and assume very singular attitudes. It was naturally a fine songster, and a most universal imitator. Whenever chopped meat or other food was put into its cage, it always evinced the propensity to deposit the bits one by one between the wires (a habit in common with the Shrikes, and which is also strikingly manifested by the *Kitta venatorius*, and sometimes even by Mynahs); and when a bee or wasp was offered, this bird would seize it instantly, and invariably turn its tail round and make the insect sting this several times successively, before eating it. A large beetle it would place before it on the ground, and pierce it with a violent downward stroke of the bill: a small Snake (about a foot long) it treated in like manner, transfixing the centre of the head, and it afterwards devoured about half the Snake, holding it by one foot while it picked it with the bill, as was its common mode of feeding.

Erase *Caprimulgus macrourus*, for the species is distinct, and not of uncommon occurrence in the vicinity of Calcutta during the cool season: besides this, the *C. Asiaticus* is here common at that time (both sexes having the white marks on the wings and tail); and I have procured one specimen of *C. monticolus*.

P. 603. The *Megalurus* mentioned was designated *Turdus toklao* by Buchanan Hamilton.

P. 789. *Vide note*. "The small species of Hawk employed in the N. W. provinces for falconry," writes Mr. Jerdon, "is much more likely the male *Accipiter besra* of my catalogue, or *Dhootee* (i. e., a handful), which is used exactly as described; if not, the male *Khandesra*, also called *Dhootee*, a species which I am confident is quite distinct, but which I have not yet procured."

Genus *Ierax*. The Assamese specimen of an *Ierax* mentioned in the same foot-note is distinct from *I. cærulescens* and new, being the fourth species of this well-defined group of very diminutive Falcons, which are as follow:—

1. *I. melanoleucos*, Nobis. This is the largest of the four, measuring six inches and a half and upwards in length, with a powerful beak of considerable vertical depth. Colour of *I. cærulescens*, but the white of the under-parts, superciliary line, and neck-spot, pure and unsullied; and what constitute ready distinctions, the tibial

plumes and under tail-coverts are pure white like the rest, and there is no frontal band, as in the others.

2. *I. Bengalensis*. *Little Black and Orange-coloured Indian Hawk* of Edwards. Length about six inches to six and a half, the wing four to four and a half. Throat, belly, thighs, vent, and under tail-coverts, deep ferruginous; breast slightly tinged with the same: superciliary line white and very broad, crossing the forehead, and continued downward to the neck-spot, which is also large and nearly or quite continued across the nape: rest as *I. caerulescens*. Inhabits Nepâl.

3. *I. caerulescens*, Auct. Considerably smaller than the two preceding, with the black of the sides continued over the whole outside of the thighs: superciliary line, neck-spot, and belly, often more or less sullied with rufous, and the white of the breast less pure than in the first species. Inhabits the Malay countries.

4. *I. erythrogenys*, Vigors, *P. Z. S.* 1831, p. 96. Philippine Islands.

P. 790. "*Ceyx tridactyla*, Lacépède, *Var.*" Is this *C. purpurea*, Lesson, from Pondicherry? The latter can hardly be *C. microsoma*, Burton, *P. Z. S.* 1837, p. 89. "*Hab.* in Indiâ Maderespatanâ."

P. 797. *Anthus Malayensis*; vide p. 885.

Indian and Malayan Oriolis. In Mr. Vigne's list of collection of birds procured by him in Tibet, Kashmir, &c., published in *Proc. Zool. Soc.* for 1841, p. 6, the name *Oriolus galbuloides*, Gould, occurs, as having been obtained in the Alpine Panjab. I have seen no description of this species, but it is not improbably that referred to *O. galbula*, loc. cit.; the specimen of which, obtained in the vicinity of Calcutta, having injured its wings and tail while I kept it caged, and its bill also being somewhat diseased, its differences from *O. galbula* (of which the Society as yet possesses only a young female, killed in France,) if any, are not obvious. The Calcutta specimen is a young male, and remarkable for having no tarse whatever of black either before or behind the eye, which is perhaps one of the distinctions of *O. galbuloides*. A very similar bird, in its plumage, occurs in a collection before me from Macao, which I suspect to be a young female of *O. Chinensis*, particularly from the form of the bill; though there is no trace of a black nape: and I would call attention to the approximating resemblance in the form of the bill of *O. Chinensis* to that of the *Plectrorhyncha lanceolata* of Gould, figured in his magnificent birds of Australia, the nest of which, also, as represented by him, and even the note as described, tending to indicate a near affinity on the part of that Australian bird to the Orioles, much closer, I suspect, than in the instance of the well known Regent-bird of the same country (*Sericulus chrysocephalus*.)

P. 799. The supposed variety of *Tephrodornis superciliosus*, having no whitish line over the eye, nor white on the exterior tail-feathers, may be designated *T. grisola*. *Lanius sordidus*, Lesson, in the *Zoologie du Voyage de M. Bélanger*, appears to be referrible to *T. superciliosus*.

P. 801. Add *Dicrurus aeratus*, Stephens, to the synonyms of *Prepopterus æneus* in the preceding page. *Dicrurus forficatus*, Gmelin, vel *cristatus*, Vieillot, is stated by Lesson to inhabit Malabar. Which species is intended?

P. 805. Mr. Jerdon informs me that he has recently procured the species of *Turnix* mentioned by Latham as Var. A., inhabiting India and China. Among Dr. Buchanan Hamilton's drawings is that of a species named by him *Turnix tanki*, which is pro-

bably the same. Length about six inches and a quarter, of the tarse two inches. Bill and legs yellow: irides white. Nape bright ferruginous: the back ashy, with faint dark cross-markings; wing-coverts light brown, having each a black spot near the tip, which is margined with pale yellowish; the breast a weak ferruginous, paler on the belly; crown light brown, with blackish margins to the feathers, the ear-coverts and over the eye light fulvescent. Evidently a very distinct species.

P. 808. I have considerable misgivings as to whether the *Coturnix flavipes* here intimated may not prove to be imperfectly mature *C. Phillipensis*, since the proportions and the colour of the legs agree, and I have subsequently obtained the latter in this vicinity: but my impression still is, that my former specimens were considerably lighter in colour.

*Perdix Argoondah* is *P. Cambayensis*, Auct.

P. 872. The adult males of *Euplectes Bengalensis* and *Eu. striatus* resemble the females when not in breeding plumage, as stated by Mr. Elliot in the instance of the former. Whether the latter be distinct from *Ploceus flaviceps*, Cuv. (but unpublished?), of the Paris Museum, remains to be ascertained. The *Fringilla Manyar*, Horsfield, *Lin. Trans.* XIII, 160, subsequently referred by that naturalist to *Ploceus*, is enumerated in his list of Dr. McClelland's birds procured in Assam; and Mr. Jerdon informs me, that the *Ploceus pensilis*, Vieillot, or *Loxia pensilis* of Latham, is mentioned as Bengalese in M. Lesson's *Traité*.

P. 880. *Herpestes*; vide p. 970.

*Kemas hylocrius*, Ogilby. "The Jungle Sheep" (of Southern India), writes Mr. Jerdon, in confirmation of my remarks on this animal, *loc. cit.*, "is certainly the Muntjac, which is well known to many Madras sportsmen by that name. I suspect, however, that it is a different species from the Javanese. The *Kemas hylocrius* is called *Ibex* by residents in the Neilgherries,—*Rock Sheep*, or rather *Goat*, by the natives. It associates in small herds on the rocky sides of the hills, and does not betake itself to the woods at all."\*

P. 882. It appears that the *Tricophorus virescens*, Jerdon, is the same as *Ixos Psidii* (*Muscicapa Psidii*, Gmelin, v. *Turdus analis*, Horsfield), a specimen of which that I forwarded to that naturalist being thus identified by him; but he certainly never sent this species to the Society, but an example of *Tr. flaveolus*, Gould, as I mentioned *loc. cit.*

P. 886 The *Ardea flavicollis*, Wagler, figured by Hardwicke, is merely the young *A. nigra*: but the former name was applied, I believe, by Latham, and would therefore have the priority.†

P. 883. The specimen assigned to *Phyllopnuste rufa* was a young example of my *Ph. lugubris*, as yet undescribed.

P. 970. *Picus strictus*, Horsfield.

The various obligations to which I am under to Mr. Jerdon, late of the 2nd Madras

\* "*Capra (Ibex) Warrayato*" is a name introduced into Mr. Gray's recent list of alleged new species; but it does not appear from his description of the head only, in what this differs from *Kemas hylocrius* of Ogilby, the animal above noticed.—In a letter which I have just received from Mr. Jerdon, that naturalist also remarks, referring to Gray's paper,—"*The Capra (Ibex) Warrayato* is *Kemas hylocrius*, as I dare say you have guessed. The specific name being the *Tamool* name of the animal." I much incline to doubt whether it occurs elsewhere than on the Neilgherries.

† The Society has just received a Chusan specimen of this bird.

Cavalry, and now Civil Surgeon at Nellore, alike for specimens, valuable information, and the identification of species and reduction of their synonyms, will be duly apparent from the foregoing remarks and emendations.

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[Note to p. 168, t. 8 from bottom, at the word "Calcutta," received after the sheet had gone to Press.]

The desired information is given, however, at least in part, in *Proc. Zool. Soc.* for 1836, p. 91, on the occasion of Mr. Owen's first distinguishing the *P. morio*, a skull of which was exhibited together with that noticed in the following passage: "Of the two crania of the Bornean Orangs, one differed materially from the other in size and in the development of the cranial ridges, the larger specimen before the Society [the other being *P. morio*] closely resembled the cranium of the Bornean *Pongo* or adult Orang in the Museum of the College of Surgeons, and differed, in precisely the same respects as that specimen, from the cranium of the *Pongo* (supposed to be Sumatran) in the possession of Mr. Cross, described and figured in the first Volume of the [Zoological] Society's Transactions (p. 380, Pl. 53), which induced Mr. Owen to entertain more strongly his original suspicion, that that cranium belonged to an Orang specifically distinct from the great Bornean species (*Simia Wormbii* of Fischer). With respect to the differences alluded to, he stated that the cranium of the great Bornean Orang was characterized by the more oblique plane of the orbits, and consequently the straightness of the contour of the skull between the forehead or *glabella* and the incisor teeth; the external boundaries of the surface were broad and had a rough irregular surface, probably in consequence of the development of the callous protuberances which characterize the sides of the face in the adult males of that species. The *symphysis* of the lower jaw was also proportionally deeper than in the (supposed) Sumatran *Pongo*. \* \* \* The sexual peculiarities observable in the cranium of both the Bornean and Sumatran *Pongos* are well marked, and are exemplified, first in a difference of relative size, that of the female being about one-sixth smaller; secondly, in a much smaller development of the cranial ridges; and thirdly in the *symphysis menti* being of less depth, the cranium of the female approaching in these respects, according to the usual law of sexual development, towards the characters of the immature animal."

Now it must be borne in mind that neither the Bornean animal with callosities (or *Simia Wormbii*, Fischer), nor Dr. Abel's Sumatran species (upon which was founded *S. Abellii*, Fischer), are really adverted to in the foregoing remarks; these appearing to be precisely the same, as shewn in the text: but two additional forms of this genus, both differing from the animal with callosities (as identified by Mr. Brook), and resembling each other, in the union of the frontal ridges posteriorly along the vertex. With regard to the rugosity of the orbits, noticed by Mr. Owen in the male Bornean skull, the same is observable in the female Bornean skull of that species in this Society's Museum; although it would appear that the animal in question does not possess the callosities: and as compared with the lower jaw of Dr. Abel's Sumatran specimen (of the animal with callosities), that of the female Bornean skull here noticed has the ascending portion of the jaw very much wider (in the *antero-posterior* direction), measuring two inches and three-quarters on a level with the insertion of the molars; while the corresponding breadth in Dr. Abel's male specimen is but two inches and a quarter: the chin also is very differently formed, being deeper and more slanting in the latter, while in the other it is sooner rounded off, and the alveolar portion of the jaw is of more even depth throughout, the termination of the *symphysis* being carried farther backward. In fact, the lower jaw alone exhibits a very striking difference in each of the three species of Orangs before me, sufficient of itself to warrant the suspicion of their being distinct.







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